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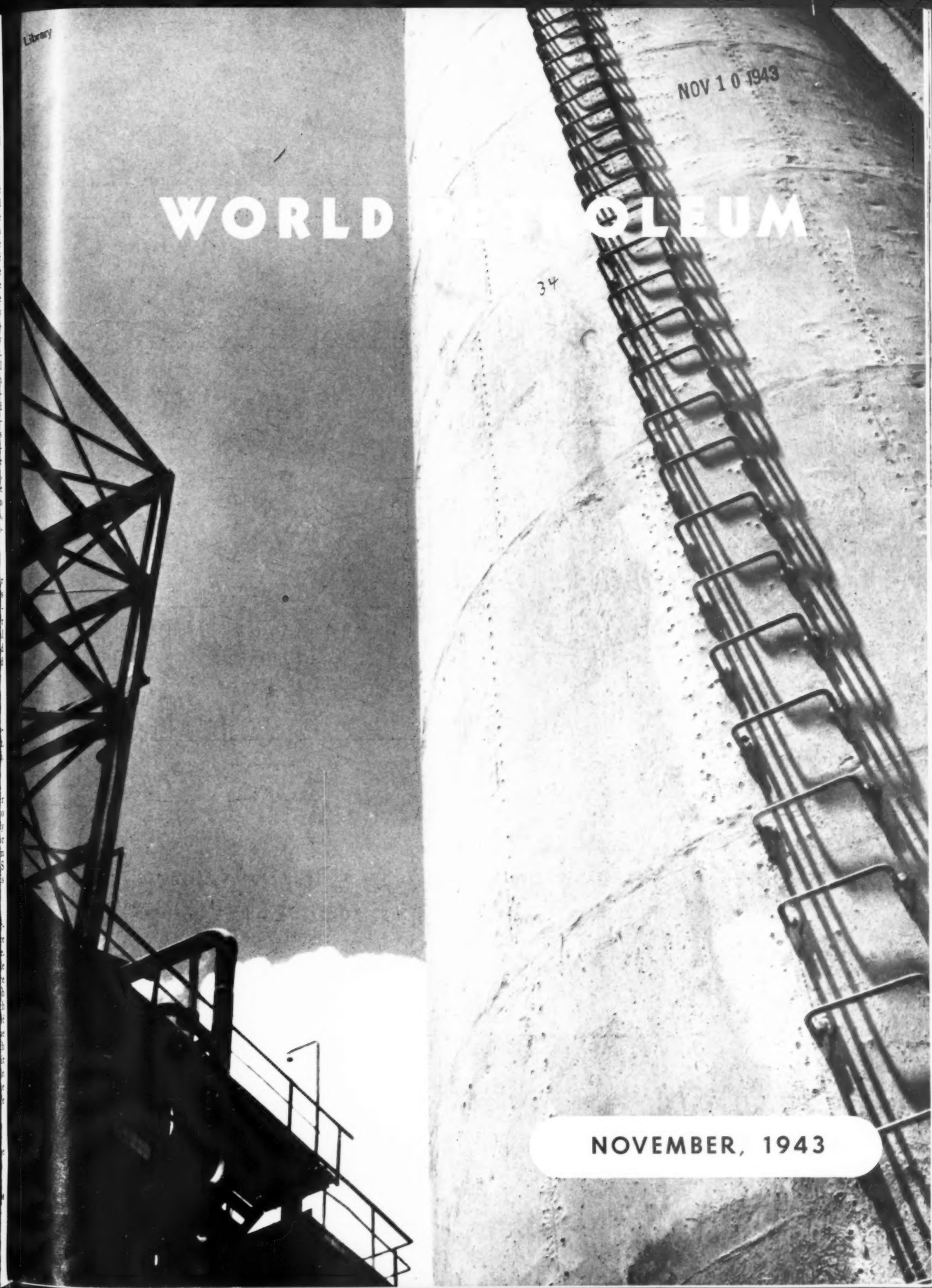

NOVEMBER, 1943

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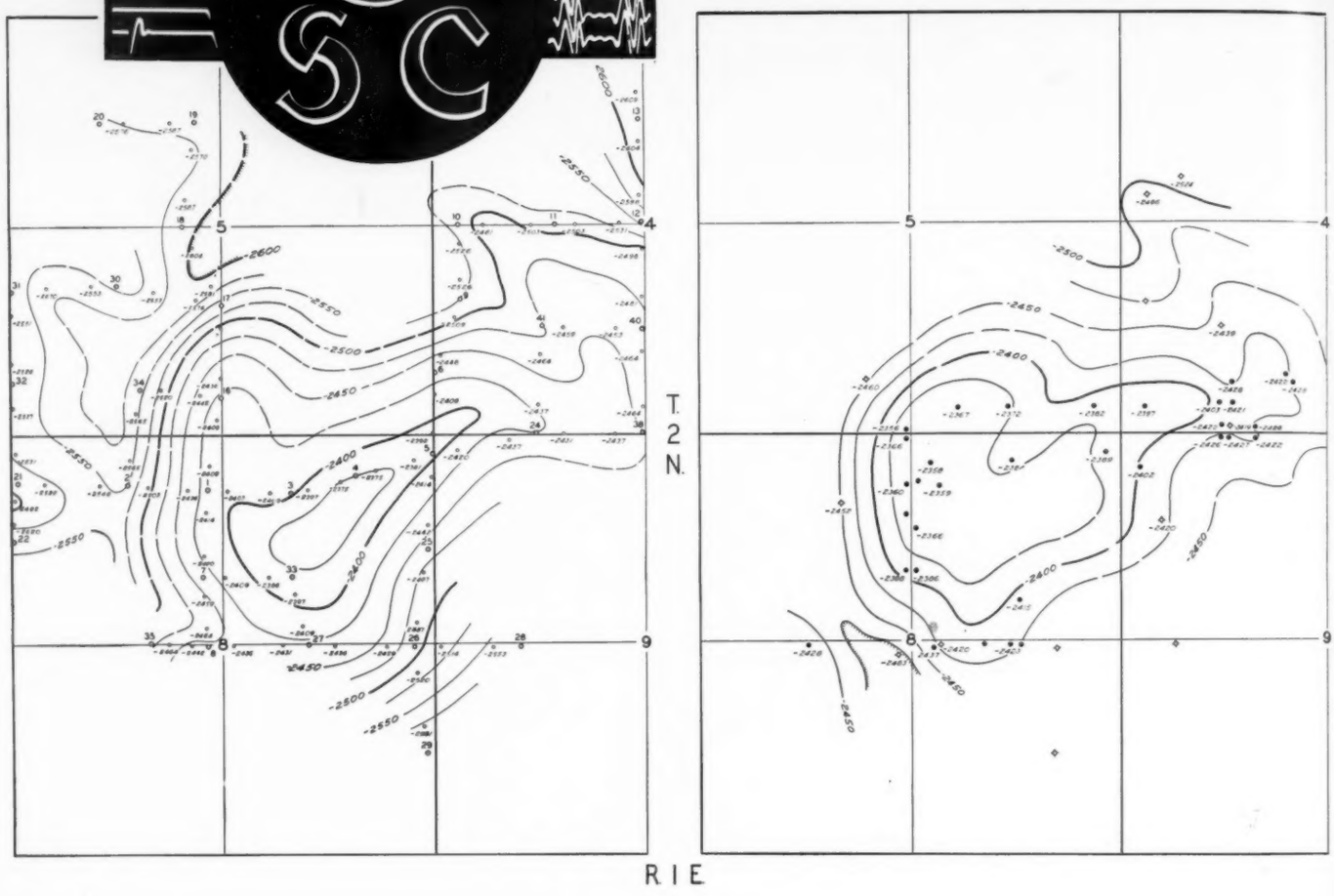

Sandoval Field—Sandoval, Illinois

SSC MAP OF DEVONIAN

Made soon after Devonian discovery well was drilled. Depths computed from an assumed velocity of 12,000 feet per second.

MAP OF TOP OF DEVONIAN
Data taken from drillers' logs.

Courtesy of the Illinois State Geological Survey.

WORLD PETROLEUM

Founded by Russell Palmer

INCORPORATING PETROLEUM EQUIPMENT EXPORTER

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

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Reconnaissance Plane on Canol Pipe Line Route Near the Yukon Divide.

EDITORIAL

GOVERNMENT'S RELATION TO FOREIGN OIL

EXTENSION by the government of the United States of its financial interests in the production and handling of oil in other countries raises questions of very direct interest to members of the petroleum industry not only those within this country but throughout the international field as well. It becomes a subject of timely importance because of discussions that have been going on in Washington over the past several months and because of the recent announcement that an American oil mission is proceeding to the Middle and Near East. The purpose of the visit as explained by Secretary Ickes, president of the government's Petroleum Reserves Corporation, is to obtain more specific information regarding producing properties and facilities in that part of the world as a follow-up to preliminary studies already made "looking toward an increasingly efficient utilization of foreign petroleum facilities for the fighting forces abroad and closer integration of foreign production and distribution into our domestic supply pattern." Mr. Ickes hinted at other activities of PRC of which he was not at liberty to speak because of their close identification with basic aspects of military strategy.

For the immediate future the significance of the information made public by the Secretary is that it confirms the decision previously announced to employ petroleum products from countries other than the United States to a larger extent in the conduct of the war from this time on and that it reflects the determination to bring into play the financial and material resources of the government to make these vital products available wherever they may be needed for the conduct of the war. Since the campaigns against the Axis powers are being carried on in corners of the world many thousands of miles distant from American bases this proposal opens a vista of increasingly broad participation on the part of the United States as a government in international oil affairs which may attain almost a global scale by the time this war is finished.

It is, of course, no secret that various agencies of government already have made some rather large petroleum commitments beyond the country's borders since the war began. The most conspicuous example is the elaborate Canol Project which involves the drilling of numerous wells in Northwest Canada, the building of a pipe line several hundred miles in length to Whitehorse, near the Alaskan boundary, and the erection of a refinery near that point. This work is being paid for by the United States but the enterprise is exclusively an Army show in which no other branch of the government is participating. It has been undertaken as a purely military measure, to provide oil for use on the Alaska Highway and in connection with possible strategic moves based on that area. The whole business can be and probably will be relinquished following the return of peace either by transferring it to the Canadian government or to private companies.

Somewhat different is the arrangement made with Mexico for the erection of a large refinery equipped to turn out aviation gasoline for which funds and materials are to be supplied from this country. The general understanding is that the financial assistance is to take the form of a loan to be paid back over a period of years either in cash or products. If this course is followed the construction of the plant will be a self-liquidating project.

Differing materially from both of these apparently is the proposed entry of the government into the oil industry of the Near East. According to published press reports the excursion of an official party to this area was preceded by negotiations with an American-owned oil company holding a long term concession in Saudi Arabia with a view to transfer of these holdings to a government corporation or alternatively the acquisition of a large financial interest in the company by the government. It is obvious that such action would put the government in a quite different and possibly less temporary relationship to oil development abroad than would a loan or an enterprise like that undertaken in Canada by the Army.

It is well known that discussions of the possible extension of government-supported oil activities to other lands have been going on in Washington since early in the year. It is reported that such action has been advocated by officers of the Army and Navy who, contrary to the belief of some portions of the public, have long had constantly before them the vital bearing of petroleum upon the success of overseas operations and the imperative necessity of maintaining the highest possible safety factor in the movement of oil products to the fighting fronts. It is believed to have had the support of some top officials of PAW, of a section of the State Department and of influential members of the inner circle of the Administration.

Where divergent opinions appear to have developed is in the manner in which such measures are to be implemented. Where it appeared desirable for military reasons to drill wells, construct pipe lines or build refineries it would be possible of course to accomplish this by means of a loan or through installations made by the government and leased to operating concerns as has been done in connection with synthetic rubber production within the country. (*Continued on page* 62)

GOVERNMENT LOOKS TO INTERNATIONAL OIL

Recent Activities in Washington Indicate Moves to Expand Near Eastern Production — Reported Negotiations for More Active Saudi Arabian Development.

Right: Persian Gulf Area and Saudi Arabia where American Owned Oil Concession is Located.

Below: Prince Amir Faisal and Prince Amir Khalid, Sons of King Ibn Saud, are greeted by Acting Secretary of State Berle on Arrival in Washington.

ON THE basis of such information as is obtainable concerning the closely guarded activities and plans of the new Petroleum Reserves Corporation, it appears probable that the United States government may emerge from the war with proprietory interests in oil properties on a global scale. Moreover, some of the plans reportedly under discussion indicate that these government ventures into foreign oil may not be limited to the duration of the war emergency nor confined to the provision of petroleum supplies that can be moved to combat areas more readily than can domestic products. Some of the ambitious projects put forward are charged with significant post-war possibilities.

Large scale commitments already have been made in certain directions by the Army, the most conspicuous being the Canol Project in Northern Canada where the drilling of a number of wells in the Fort Norman district and the building of a pipe line over the mountains to Whitehorse has been undertaken as a means of supplying oil for motor vehicles moving over the Alaska highway and for possible use in military operations based on Alaska.

These enterprises have been undertaken as part of the preparation for the attainment of specific military objectives and the arrangements covering them are such that they can be liquidated when the war ends. The more elaborate projects now believed to be under consideration are of quite a different character. They will not be under military direction but will be carried out by administrative agencies of the executive branch of the government. If the views of some influential members of the administration prevail, they will continue to function under government auspices long after the end of the war.

Serious discussion of governmental participation in oil operations beyond the borders of the country began in Washington as far back as February of this year. These discussions are understood to have embraced possible undertakings in both the Eastern and Western Hemispheres. Certain developments have acted, however, to concentrate special attention on the Middle East. One of these has been the wresting of control over the Mediterranean from the Axis so that it has become a comparatively safe highway for the movement of merchant ships and makes possible the transportation of oil from eastern ports to southern and western Europe. Another has been the growing conviction that rising war demands cannot be met entirely from the United States without undue strain upon its own reserves or interference with its internal industrial economy. Several months ago, General Somervell, Chief of the Army's Services of Supply, revealed to a Congressional committee, that plans had been projected for the greater utilization of oil from the Near and Middle East, including the expansion of production and the provision of additional refining facilities in that area.

Confirmation of the government's interest in this region was provided in a statement by Petroleum Administrator Ickes, who also is president of Petroleum Reserves Corporation, that he was sending E. L. DeGolyer, outstanding geologist, who resigned recently as Assistant Deputy Petroleum Administrator to become consultant to PRC, and W. E. Wrather, Director of the U. S. Geological Survey, as part of a mission to go to the Middle and Near East.

"Since its organization on June 30, 1943," Mr. Ickes said, "the Petroleum Reserves Corporation has been studying and discussing the whole problem of oil production, refining and distribution in the Middle and Near East. The Corporation's activities, however, are so closely identified with basic aspects of military strategy that they cannot be disclosed publicly in detail. But the fact that we have not talked does not mean that we have not acted. Substantial progress has been made. Preliminary studies have been completed and solid groundwork laid for more comprehensive action looking toward an increasingly efficient utilization of foreign petroleum facilities for the fighting forces abroad and closer integration of foreign production and distribution into our domestic supply pattern. It is now necessary to undertake studies in the field to perfect our information from first-hand surveys and observations of the oil producing properties and facilities. The Corporation, whose directors are the Secretaries of State, War, Navy, Interior and the Director of the Office of Economic Warfare, made arrangements several weeks ago to send a technical mission to the Middle and Near East oil fields. Among those on this important assignment will be E. DeGolyer, a consultant to the corporation and former Assistant Deputy Petroleum Coordinator and one of the world's outstanding petroleum geologists, and W. E. Wrather, director of the Geological Survey, Department of Interior. The mission will leave as soon as final arrangements can be completed and I hope to be able to announce the names of the other members shortly."

Since the concessions of Iran and Iraq are in the hands of British companies in which the British government itself has a financial interest the logical place for the United States government to select as a field for its operations is generally agreed to be Saudi, Arabia. In that country, comprising the greater part of the Arabian peninsula, an American company, the California Arabian Standard Oil Company, holds a very extensive concession which is still in the early stages of development. Exploration of parts of this area indicates however that it contains very large deposits of oil, probably running to several billion

WORLD PETROLEUM MAP

barrels. Strategically Saudi Arabia is so located that its oil could be moved either westerly through the Mediterranean or in an eastward direction to support operations in the Pacific.

Statements have been published without denial that government officials have been in negotiation with representatives of the California Arabian Standard Oil Company looking either to the acquisition of its holdings by the government or to government participation in the development of its oil reserves. An interesting coincidence with these discussions was the presence in Washington of two Arabian Princes, sons of King Ibn Saud, who, naturally, would be consulted on any projected activities within his realm.

Petroleum Reserves Corporation would seem to be the logical vehicle for government oil activities since its charter authorizes it to do about everything in foreign petroleum operations. It states as the purpose of the corporation: "to buy or otherwise acquire reserves of crude petroleum from sources outside the United States, including the purchase or acquisition of stock in corporations owning such reserves or interests therein, and to store, transport, produce, process, manufacture, sell, market, and otherwise dispose of such crude petroleum and the products derived therefrom; and the Corporation shall have the power and authority to do and perform all acts and things whatsoever necessary thereto, including, but without limitation, the power to borrow money and issue its secured or unsecured obligations therefor; to adopt and use a corporate seal; to make contracts; to sue and be sued; and to construct and operate outside the United States such refineries, pipe lines, storage tanks and other facilities as are necessary in connection with carrying out the objects and purposes of the Corporation as above stated."

The government thus, through PRC, can acquire concessions of oil fields from foreign governments. It can operate them itself, or it can lease them to operating companies. In the latter position, the United States would stand between the foreign government and the oil company. The foreign government would be protected from exploitation by the oil company, and the company, in turn, could operate without fear of expropriation of the properties. As owner of the concession, the United States could take steps to protect its property that it could not take if merely a private company were involved.

PRC's charter places no time limit on the corporation's life. The amended charter—the amendment was made by Board Chairman Leo Crowley on August 9—declares that the "Corporation shall have existence until dissolved by the Director of Economic Warfare or by Act of Congress."

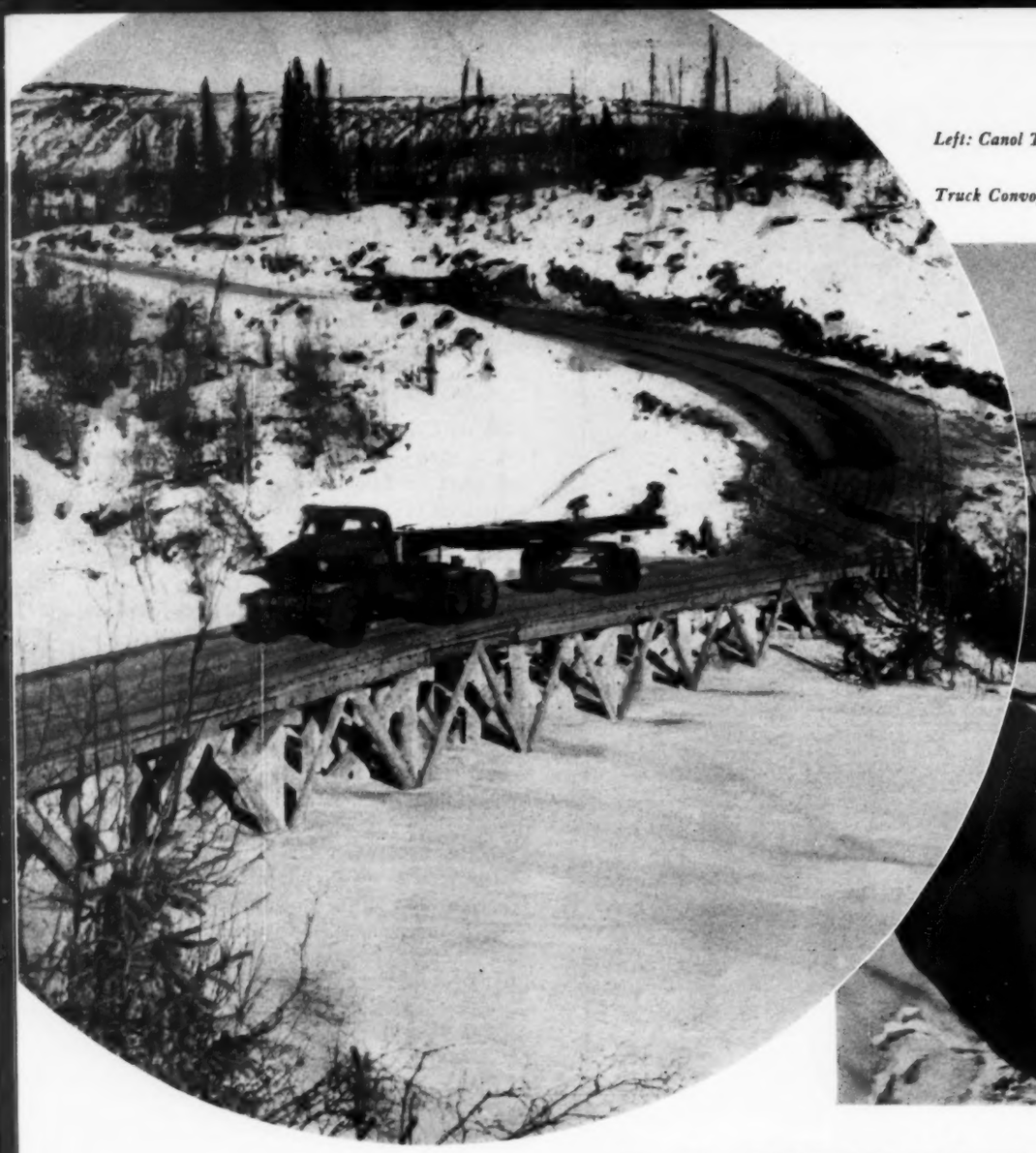
Thus far Congress, by and large, has taken only a mild interest in the corporation. Congressmen look upon the corporation as a war agency and are inclined to view with favor its projected operations so far as these have been made known as an answer to protests against the depletion of domestic oil reserves. They feel that the use of foreign oil in the war will relieve the drain in this country and possibly allow more gasoline and fuel oil for home use.

Some few members, however, are beginning to exhibit curiosity as to the legality of PRC. And although no steps appear likely to be taken by Congress in the near future to satisfy this inquisitiveness, the matter may be brought up at a time when the military situation is not so dominant. The question involved is whether RFC Chairman Jesse Jones had all the authority necessary to set up such an organization without Congressional approval. Mr. Jones, it will be recalled, chartered PRC June 30, 1943, the last day of his authority to charter RFC subsidiaries under Section 5 of the Reconstruction Finance Act, as amended.

At the moment, Mr. Jones was engaged in a controversy with Vice President Wallace over the handling of certain RFC financial activities in South America and two weeks later the President transferred Mr. Wallace's Board of Economic Warfare and certain of Mr. Jones' RFC agencies to a new Office of Economic Warfare, with Leo T. Crowley as director. Among the RFC agencies shifted from Mr. Jones was the newly created PRC, which at that time existed only as a charter. It had no personnel, not even an office.

(*Continued on page* 62)

E. L. DeGolyer, who Heads U. S. Mission to Near East.



Left: Canol Truck and Trailer Hauling Pipe over the Alaska Highway

Truck Convoy Crossing Swampy Region on the way to Norman Wells

U. S. ARMY TAPS CANADIAN OIL FOR ALASKAN-BASED OPERATIONS

By Richard Finnie

Richard Finnie, author of the accompanying article, is a well known authority and writer on the Canadian Northwest. He has been connected with the Canol Project since its inception as consultant and historian. In November 1940 Mr. Finnie contributed to WORLD PETROLEUM a very complete account of the history and development of Norman Wells.

THE JAPANESE attack on Pearl Harbor hastened the development of northern Canada about a hundred years. It started the Alaska Military Highway and the Canol Project—by far the biggest construction program, in respect to territory covered, in the history of the world.

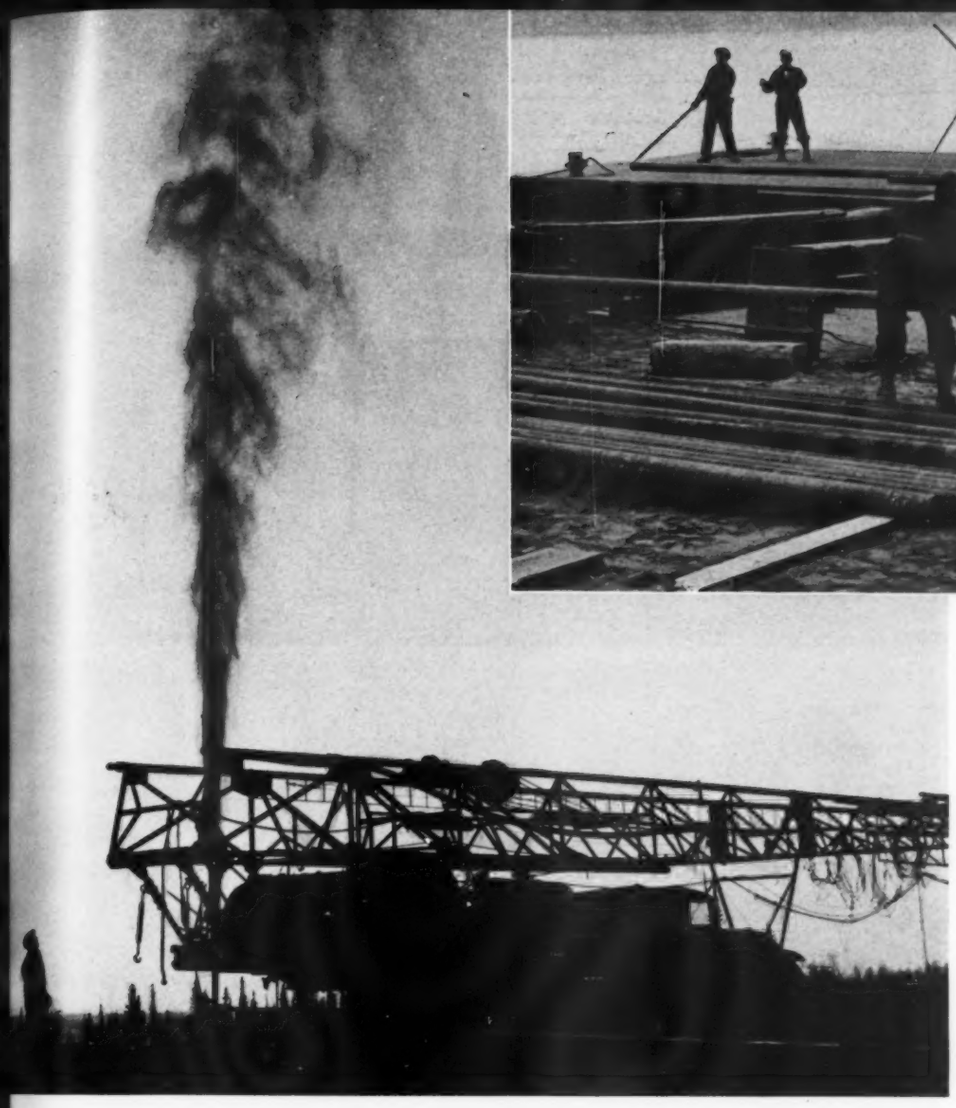
"An aerial campaign against Japan could be pushed to best advantage from Alaskan air bases," said the late Brigadier General William Mitchell a score of years ago, and belated recognition of that opinion is reflected in the fortification of Alaska, in the building of the Alaska Highway, and in the Canol Project.

With the Japanese occupation of Attu, Agattu and Kiska, Americans and Canadians became suddenly and painfully aware of the proximity of Alaska and its Aleutian Islands to Japan; and many of them, studying global maps for the first time, saw that Fairbanks in the very heart of Alaska was only 3500 miles from Tokyo. They saw also that from San Francisco to Japan the air route via the Aleutians was nearly two thousand miles shorter than the Hawaiian route. They saw that Attu Island, last in the Aleutian chain, was 750 miles from the Japanese Kurile Islands, with air and naval bases. They saw that the westerly tip of Alaska was less than sixty miles from Asia.

But to defend Alaska and, better still, to strike at Japan from Alaska, would require tremendous quantities of equipment and fuel. Alaska was attainable only by air or sea. Men and equipment and fuel could be shipped to Alaska, but freighters and tankers were needed elsewhere, and there was an ever present threat of enemy action in Pacific waters.

There would have to be a road and there would have to be fuel. Alaska had petroleum but it was remote and undeveloped. (In 1923 a naval petroleum reserve was set aside near Point Barrow but never tapped, and in the Katalla district on the coast east of the Copper River wells were drilled but they did not produce enough oil even for local consumption.) The nearest ready source was in the lower Mackenzie Basin 700 air miles from Fairbanks.

Of the three provisional districts—Mackenzie, Keewatin, and Franklin—comprising the 1,300,000-square-mile Northwest Territories of Canada, Mackenzie, with a total area of 527,490 square miles, has the greatest advantages of climate, natural resources and accessibility.



At Norman Wells Just Below the Arctic Circle a New Well is Brought In.

Colored Troops Load Pipe at the Railhead North of Edmonton.

Precipitation is light and temperatures are moderate, especially in summer. Throughout the district there are at least three months of continuous daylight in summer, when the mercury rises to 70° and higher in the shade; and in winter temperatures are seldom lower than 50° below zero, albeit they may not rise above freezing for five months.

The Mackenzie River in length and drainage is second on the North American continent only to the Mississippi, the Yukon River coming third. It flows through a broad, almost level forested plain between the Cordilleran highland on the west and the more subdued but rugged, partly treeless Laurentian Plateau or Canadian Shield on the east, and empties into the Arctic Ocean. It is navigable for boats of three- to four-foot draft without interruption for 1300 miles from Fort Smith, 500 miles north of Edmonton, to its mouth.

Until 1929 transportation was exclusively by dog team in winter and by boat in summer, with paddle-wheel steamers superseding the canoes and York boats of the early days. That year was a turning point in the history of the district, for it was then that the Arctic Circle was crossed along the Mackenzie for the first time by aircraft.

In 1931 mining was first begun at Great Bear Lake on silver-pitchblende property (Eldorado) that soon tumbled the world price of radium. Oil wells on the lower Mackenzie, which had been tapped in 1919 and later capped for lack of a local market, were reopened to provide fuel for the new industry. In 1935 attention was focussed on the north arm of Great Slave Lake, where in 1938 the Territories' first gold brick was poured near the town of Yellowknife which had sprung up at the mouth of the Yellowknife River.

Mining development was expedited by tractors as well as by boats and airplanes. A winter road was constructed from railhead in the Peace River country 400 miles along the valley of the Hay River to Great Slave Lake. The work was done by the Province of Alberta, but the Dominion Government paid more than two-thirds of the cost. The first tractor-drawn load of freight was delivered to Yellowknife over this road and the ice of Great Slave Lake in the winter of 1939.

The presence of oil on the lower Mackenzie was noted as far back as 1789 by Alexander Mackenzie, the young Scottish fur trader and explorer whose name was given to the river down which he canoed to the Arctic. In 1919 the Imperial Oil Company (subsidiary of Standard of New Jersey) sent a drilling crew to a location on the right bank of the Mackenzie 52 miles below the trading post of Fort Norman. The following summer a well was brought in, but the local market was then too small to warrant production. Fur was still king and in the 1920s there was no industrial activity in the country. The largest fuel users were the steamboats, and they burned cordwood. The Imperial Oil Company capped the several wells that had been drilled by 1925 and withdrew.

In 1932 the fuel requirements of the new radium mine at Great Bear Lake justified the reopening of the Norman field and the drilling of new holes. From then onward Norman Wells (the present post-office name of the camp) produced steadily. The development of gold mines around Yellowknife in 1937 gave an additional outlet for Norman oil.

In 1939 Norman Wells installed a modern straight-run 840-barrel refinery so that the field could fully supply the local market for engines on water, on land, and in the air, turning out not only fuel oil and motor gasoline but 87-octane aviation fuel as well. Part-time summer operation took care of the demand, and 1941's production was a little less than 24,000 barrels of high- and low-test gasoline and several grades of oil.

But this could be increased many times with increased storage facilities if the refinery were kept going through the four seasons, drawing from only the three wells which were then available. Because the Norman crude, which has a paraffin, not an asphaltic, base, will flow at 70° below zero, winter operation would present no insuperable difficulties.

Whereas the Alaska Highway has been the subject of innumerable newspaper and magazine stories, the Canol Project, designated by the War Department as "restricted," was hush-hush from its inception until the story "broke" on June 19, 1943.

Barges Traverse the Portage Around Slave River Rapids.

On May 15, 1942, in the House of Commons, the Hon. C. D. Howe, Minister of Munitions and Supply, stated: "Arrangements have been made to develop further the wells on the lower Mackenzie at Fort Norman. Additional wells are being drilled, the refinery capacity being increased, and a short pipeline is being installed to bring the oil across to the location of the Alaska Highway." That was all. But he was referring to what was to become the Canol Project. Canol: the words Canadian Oil telescoped.

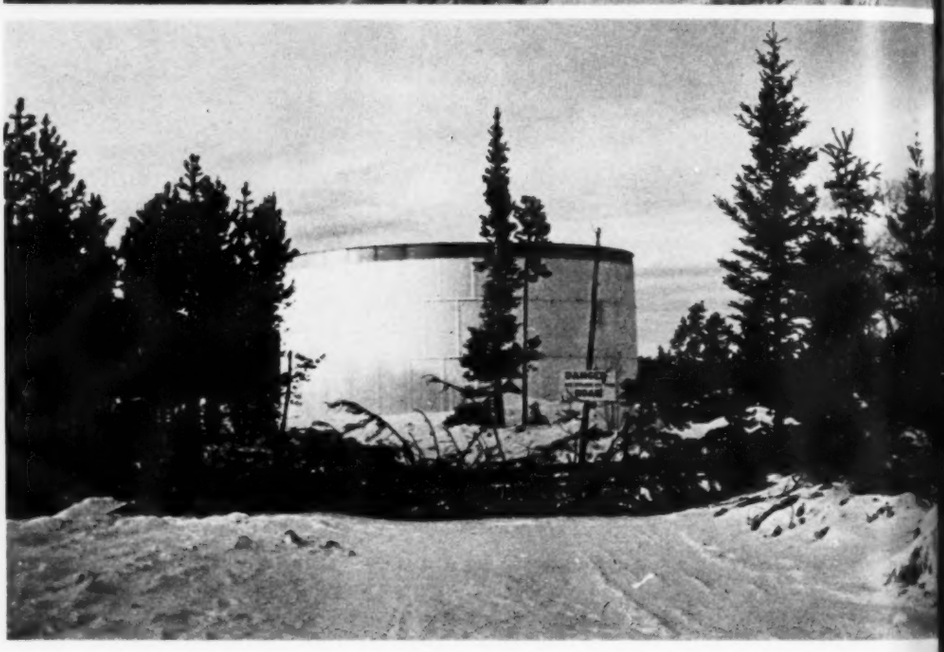
It was the culmination of a campaign waged over a period of several years by Dr. Vilhjalmur Stefansson, the Arctic explorer and scholar, and others familiar with the potentialities of northern Canada, to induce the U.S. War Department to develop a nearby oil source for Alaska.

Stefansson had proposed not only that Norman oil be developed but also, as a corollary, that a supply route to Alaska be opened through the Mackenzie River Basin—which Norman could fuel—rather than either of the British Columbia routes recommended by the International Alaska Highway Commission, or the Dawson Creek-Whitehorse route that was finally pushed through. But the selection of the latter route did not rule out the Mackenzie: for oil was still needed as urgently as ever in Alaska and it was needed to fuel the new highway.

Stefansson had wanted a supply route and a pipeline run from Norman Wells on the lower Mackenzie to Mayo at the head of navigation on the Yukon system, or to Dawson, where there could be a refinery. The Keele River, emptying into the Mackenzie 100 miles above Norman Wells, could be followed to its source on the Mackenzie-Yukon divide, then the road and pipeline would pick up the Hess, a tributary of the Stewart which in turn flows into the Yukon River. Later, after consultation with Dr. Charles Camsell, Deputy Minister of Mines and Resources, who had explored parts of the Mackenzie-Yukon divide in his youth, Stefansson considered that a more northerly route would be easier—from the neighborhood of Fort Good Hope, just south of the Arctic Circle on the Mackenzie, to the Peel River on the Yukon side and thence to Eagle, right on the Yukon River in Alaska, and on to Fairbanks.

To Stefansson's gratification the U.S. War Department decided to develop Norman Wells and put a pipeline over the divide—but, to his consternation, not to Mayo or Dawson or Eagle, but in a beeline to Whitehorse. He regarded this as a point too out of the way and too vulnerable. But Whitehorse was right on the Alaska Highway, where fuel would be needed for trucks and tractors as well as aircraft.

The Alaska Highway was already well under way from Dawson Creek to Whitehorse and Fairbanks when, on May 20, 1942, a War Department contract was executed in Washington for the further development of Norman Wells and the construction of a pipeline from the Wells to Whitehorse. This was to be the Canol Project, and participating in it were to be the Imperial Oil Company, Standard Oil of California, J. Gordon Turnbull and Sverdrup & Parcel (as Architect-Engineers), and Bechtel-Price-Callahan (as Constructors). Fulfilment of the contract was to be aided and supervised by the U.S. Corps of Engineers, with Colonel Theodore Wyman, Jr. as Officer in Charge.



Canol Storage Tank—The Frost Accumulation Shows that it is Full.

A week later Colonel Wyman and representatives of the Constructors and Architect-Engineers were arriving in Edmonton, the control base, and 2500 U.S. Engineer troops, most of them colored, were en route to Waterways, end of steel 300 miles north. Rolling with them over the second most northerly railroad with a main-line connection (first: Churchill) were 15,000 tons of pipe. This was for the line from Norman Wells to Whitehorse; and, curiously, while it was the first thing sent it was the last thing needed.

Exploring had to be done, for the Mackenzie-Yukon divide area was among the least known in the Northwest Territories; and an airplane was dispatched from Edmonton on June 6 to fly to Norman Wells and thence to Whitehorse.

But the biggest over-all problem was transportation. Many thousands of tons of equipment and supplies along with personnel must be moved fourteen hundred miles from Edmonton before the job could be started. There were consultations with specialists in northern transportation and plans were made. The season for river freighting was on, and everything must be moved by rail 300 miles to Waterways, by boat and barge 285 miles down the Athabaska and Slave Rivers to Fort Fitzgerald, over a 16-mile portage necessitated by rapids, then on down the Slave 190 miles to Great Slave Lake, another 125 miles across the lake to the head of the Mackenzie proper, and 500 more miles to Norman Wells, 75 miles south of the Arctic Circle.

A couple of hundred carpenters and laborers hastily recruited in Edmonton built a camp and loading facilities at Waterways, prefabricated barges were assembled, and, with troops operating pontoon rafts, freight started to float down the Athabaska before the middle of June. Within a year the Canol Project was destined to have many thousands of people on its payroll, exclusive of troops.

Existing transportation facilities were mainly those of the Hudson's Bay Company and the Northern Transportation Company, and they were geared to handle about ten thousand tons in a summer; besides this normal quota there would be at least thirty thousand tons for the project's first season.

The U. S. Corps of Engineers and the constructors, moving on to Fort Fitzgerald and Fort Smith (on the 60th parallel of latitude, the border between Alberta and the Northwest Territories), set to work augmenting wharfs and improving the roads. Hundred-ton, two-hundred-ton and three-hundred-ton barges were lifted bodily from the water at Fort Fitzgerald and trundled over to Fort Smith and launched.

Meanwhile, airfields were being built. Hitherto in the Northwest Territories all flying had been done on skis in winter and on pontoons in summer. Canadian Airways Limited and Mackenzie Air Service Limited and their predecessors, and now their successor, Canadian Pacific Airlines, had safely flown millions of miles in the North; but their operation was handicapped by the limitations of their skis and pontoons, for there were the in-between seasons of a month or two in fall and a month in spring when neither skis nor pontoons could be used. These delays could be overcome, and large cargo aircraft employed, only through the construction of airfields. So the Army and the constructors, with bulldozers, carryalls and scrapers, hacked out landing strips all the way from Edmonton to Norman Wells. Most of them were ready for use three weeks or a month after the first trees had been dozed over.

Unloading Equipment from Barges Beached at High Tide.

Norman Wells is on the right bank of the Mackenzie, and a camp was established on the opposite side five miles away. In July and August surveyors, constructors and Army engineers were making the first attempts at road-building toward the Mackenzie Mountains, rising to a height of eight thousand feet, some twenty-five miles back from the river.

Aerial reconnaissance flights were being made between the Wells and Whitehorse, a distance of 550 miles, and photographs were taken of several possible routes. Real exploring had to be done, for knowledge of the divide country was sadly limited and fragmentary. A few gold-seekers had gone to the Klondike via the Keele River in '97 and '98, and the Mountain Indians regularly ascended the Carcajou, farther north, on hunting forays, returning down the Keele in moose-hide boats; but the only published report on this part of the divide was that of Joseph Keele, a Canadian surveyor who traversed it in 1907-08.

Two salient facts emerged from preliminary investigations: construction of a road and pipeline over the divide would not be easy, and work should be carried on from both ends. But at the outset the shipping of materials to the Yukon was possible only through Skagway, and that port was already clogged with freight for the Alaska Highway. By August, 1942, however, after the Japanese situation in the Aleutians had been brought under control, arrangements were made to bring in equipment, supplies and pipe via Prince Rupert, Skagway, and thence over the 110-mile White Pass and Yukon Railroad to Whitehorse.

Camps were established at Prince Rupert, Skagway, Carcross and Whitehorse. Pipe was being strung and welded in October, and by early in 1943 trucks of the Alaska Highway were driving up to filling stations at Whitehorse to receive gasoline.

By the end of September a pipeline had been put across the Mackenzie between Norman Wells and Canol Camp, and 600 colored troops, white troops and a couple of hundred civilian workers were settling down for the winter. The colored troops, who had handled pipe and done general stevedoring all summer, now were building log cabins and cutting firewood to keep themselves warm. More than a dozen new wells, all of them producers, had been drilled, and big storage tanks were under way. By the end of October when freezeup began, nearly all of the boats and barges that had carried freight and men until the last minute, were drawn up on shore or safely berthed. Among these were the Hudson's Bay Company's sternwheelers, the *Mackenzie River,* built in 1907; and the *Distributor,* built in 1921. The latter, with a half dozen barges clustered about her, had on one trip taken the largest single load of freight down the river—1,300 tons.

The summer's operation, considering the haste with which it had had to be organized, was sat-

Truck and Bulldozer Battle Mackenzie Valley Mud.

isfactory. Some 21,500 tons had gone over the Fitzgerald-Smith portage. But not all of that had been delivered to the jobsite. For instance, nine thousand tons of pipe for Canol lay piled at the delta of the Slave River. A great deal more freight would be needed at Canol Camp before breakup.

In October the constructors built a camp at the town of Peace River, at rail's end 310 miles northwest of Edmonton, and the troops who had been at Waterways and Fort Fitzgerald were brought there. Then began work on a winter road to the Mackenzie. There was already an all-weather provincial road 85 miles northward, and a tractor trail to the mouth of the Hay River; but much of the latter had to be improved and relocated, and a cutoff had to be run from Alexandra Falls on the Hay River to the lower end of Mills Lake below Fort Providence. Pioneering was done by white and colored troops, the constructors following. In December truck convoys and tractor trains were rolling. They had 9,000 tons of freight to move. They were delayed and plagued by Chinook thaws and lack of snow, but they kept going.

At the same time a civilian tractor crew was heading southward from Norman Wells, crossing the Great Bear River on the ice, and continuing through unmapped wilderness fifty to sixty miles inland from the Mackenzie, on the east side. The weather was bitterly cold and the men's only food was canned Army "C" rations which they heated in their tractor motors. An Army crew was working inland from Fort Simpson, and another civilian crew was progressing northward from Mills Lake.

On the 24th of February a tractor from the north met a tractor from the south at Blackwater Lake. Their blades accidentally touched. One driver said to the other, "Why don't you look where you're going?", and the reply was, "Why don't you learn how to run a cat?" Fisticuffs were narrowly averted, and that was the only ceremony attending the completion of a pioneer road down the Mackenzie Valley.

Immediately truck convoys and tractor trains, having trekked northward 500 miles from Peace River to Mills Lake, continued another 500 miles to Norman Wells and over the ice to Canol. And they kept moving until the latter part of April when they began bogging down in spring mud. Most of them reached Canol; some were obliged to turn in 60 miles to Fort Simpson; but none were left on the road.

During the winter the Army had pushed a trail from Fort Smith to Hay River, over which equipment needed on the Norman road was driven; and between February and late April, thousands of tons of pipe were hauled on sleds pulled by tractors 220 miles across the ice of Great Slave Lake from the Slave Delta to Mills Lake, thence to be carried on barges to Canol Camp after breakup.

There was still another operation. At Dawson Creek, 490 miles northwest of Edmonton, constructors and the Army Engineers built a camp, and in January they started freighting supplies and pipe over the Alaska Highway.

In December the Canol Project was brought under the direction of the Northwest Service Command, headed by Brigadier General James A. O'Connor; and in March Colonel Wyman, who was given another command elsewhere, was succeeded by Brigadier General L. D. Worsham U. S. Corps of Engineers, Northwest Division, in immediate charge of the Canol Project.

From November through April dog-team and tractor parties were working from both ends of the Norman-Whitehorse line. When breakup came in May the stage was set for the long pull over the mountains. A route had been selected and access roads were already under way.

Meanwhile in the Norman Wells area producing wells were drilled. Though many more would be brought in during the coming summer and fall, a more than adequate supply of oil was already assured to fill the original quota to be pumped through the line. The wells were shallow as oil wells go, averaging about 1400 feet and taking two or three weeks each to drill.

Because of the low pour-point of the Norman crude, the line would not have to be buried or protected in any way from frost; it would lie right on the surface of tundra and rock.

To string and lay pipe you must have a road, and this means that it will soon be possible to drive a truck from Canol Camp on the Mackenzie across the divide to the Yukon.

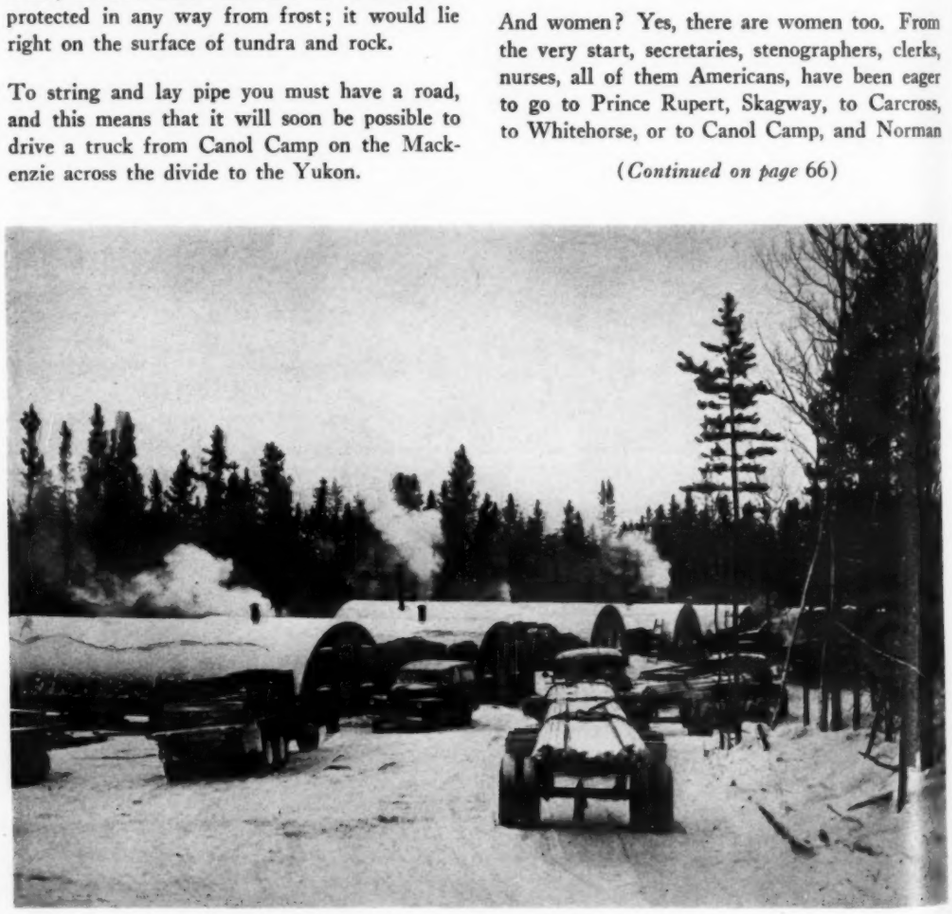
What sort of people have done and are doing all this frontier pushing? Among the troops, the colored boys are mostly from Georgia, Alabama, and Texas. The white troops are from almost every state in the Union. The colored troops at Canol Camp faced the winter with forebodings; they expected to freeze to death; but they came through unscathed and now they look upon themselves as heroes.

Because of Canadian labor restrictions the proportion of Canadians on the Canol Project is small. They include famed bush pilots and bush surveyors, barren-land trappers and dog-drivers, river pilots and road builders, carpenters and catskinners. Among them are a few Indians (the Project hasn't touched Eskimo country yet) who serve as pilots, canoemen, guides and drivers.

The civilian workers, the carpenters, truck drivers, catskinners, riggers, crane operators, welders, cooks and so forth, are mostly from Oklahoma, Minnesota, Wisconsin, Texas, and some from California. Although they are making more money than most of them ever made in their lives before, there has been a ten per cent per month turnover due partly to homesickness and restlessness. But among them are imaginative, visionary men who recognize the potentialities of the North. They feel they are in on the ground floor, and they talk of coming back after the war to settle down.

And women? Yes, there are women too. From the very start, secretaries, stenographers, clerks, nurses, all of them Americans, have been eager to go to Prince Rupert, Skagway, to Carcross, to Whitehorse, or to Canol Camp, and Norman

(*Continued on page* 66)



A Cold Winter Day at a Construction Camp in the Yukon.

PIWC meets, Dec. 8, 1941

OIL INDUSTRY'S PART IN THE WAR

In Two Years Has Completely Changed Its Normal Operations and Has Been Streamlined to Serve Military Demands—Has Met and Solved National Emergencies and Is Contributing Decisively to Allied Victory.

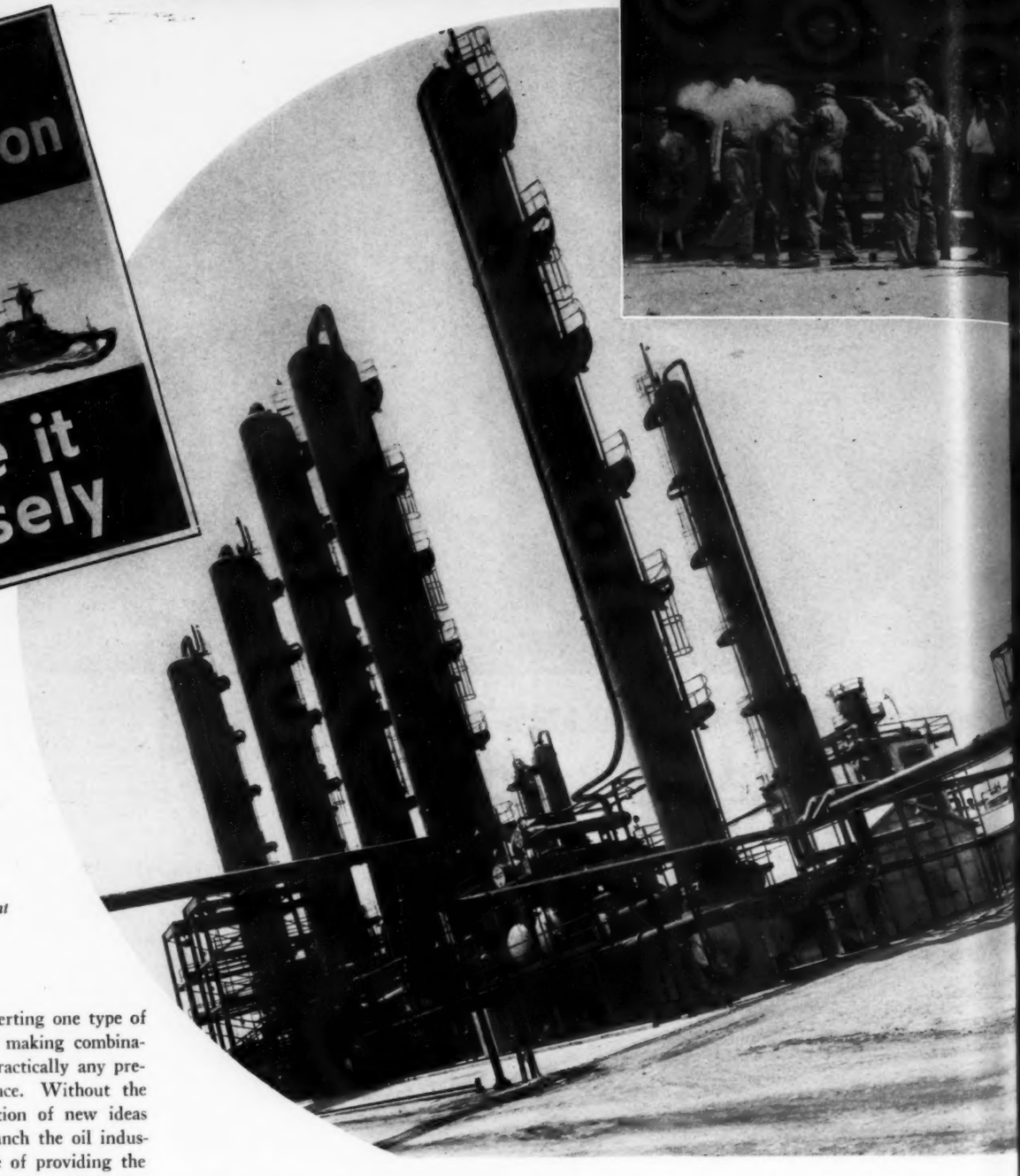
Two years ago the oil industry, through the API, at its San Francisco meeting, pledged its determination to do everything within its power to aid in meeting the emergency which the nation then faced and gave assurance that it would supply the petroleum products needed in whatever quantity required for the country's defense. Today, twenty-four months afterward, is a suitable time to see how that promise has been kept and to review what the industry has done toward carrying forward the war effort to a point where a successful outcome is clearly in sight.

Even before the gathering war clouds gave portent of the storm that was soon to break, the oil industry had gone a long way toward laying the essential groundwork for meeting the unprecedented demands that were to follow. Under the spur of intense competition, the oil companies had devoted a constantly increasing amount of money and effort to the improvement of its processes and products and to experimentation to develop new applications of the materials with which it operated. An era of intensive development along these lines began directly after World War I and brought about great, almost revolutionary, changes in methods of finding and processing crude oil. This was a time of swift expansion in the automotive industry that led to an undeclared race between the technical experts of the oil industry and the engineers engaged in designing automobile engines. As the latter introduced changes calling for fuel of higher quality, the former provided such fuel and as the former developed gasoline of more power and better antiknock characteristics the latter produced motors which could use these superior grades. The process was a convincing demonstration of the progress that takes place under private initiative in a free competitive system. Some measure of the advancement in refining procedure is afforded by the fact that between 1920 and 1939 the quantity of gasoline obtained from a 42 gallon barrel of crude was raised from ten gallons to nearly twenty gallons. Except for this increased recovery it would have been impossible, in spite of the many new oil fields opened, to satisfy the tremendous growth in demand for motor fuel. The country was saved from an oil shortage and the triumph of technology was made the more impressive by making it possible to supply the enlarged requirements at steadily a decreasing price.

As the practical value of scientific research and investigation demonstrated itself the manpower and equipment devoted to such study rapidly increased. In the dozen years preceding the outbreak of war in Europe, the personnel employed in petroleum research multiplied nearly five and one-half times, more than double that of any other large industry. The sums allotted to such work grew even more rapidly. Great laboratories were built and filled with elaborate equipment for the conduct of all sorts of investigations. Research was expanded to include an intensive study of the chemical components of petroleum and of their characteristics. Purely scientific explorations as distinguished from those directed to an immediate commercial application were undertaken. Some of these which appeared to be of only academic interest at the time have become of incalculable value in the critical period through which the world is now passing.

Back in 1935 a series of laboratory experiments resulted in the production of a gasoline of superior grade with a high content of iso-octane. It represented the attainment of the 100 degree mark in an octane scale on which 60 or thereabouts was the average marketing requirement. It was a scientific curiosity for no engine built at the time could utilize it and the cost of producing it was prohibitive had no mechanical obstacle existed. Yet this discovery became the very foundation of the aerial domination which is proving the decisive factor for the United Nations in the present world conflict. A few years earlier a leading American company had acquired the rights to a hydrogenation process which through further study and experiment was made applicable to the attainment of important advances in the manufacture of aviation and other fuels. In a similar way the acquisition of a process for making an acceptable substitute for natural rubber which was of no immediate value at the time, when the natural product was available at far lower cost, has made it possible to create an entirely new industry within a space of months to serve a vital national need.

Many other examples could be cited of advances in technical knowledge made during this pre-war period which have become of critical importance in the conduct of the war itself. The knowledge of hydrocarbon chemistry obtained through research has advanced to a point where the technologist can effect an almost infinite variety of



Right: Shell toulene plant at Wood River.

molecular rearrangement, converting one type of hydrocarbon into another and making combinations to develop products of practically any prescribed quality and performance. Without the painstaking labor and application of new ideas contributed by its research branch the oil industry would have been incapable of providing the great and perhaps decisive advantage which the Allies possess in carrying on the war and which assures them of ultimate victory.

From the time when it began to appear that the country would have to undertake a great expansion of its air, sea and land forces the oil industry had been putting itself in readiness to supply the products needed by these forces. It had cooperated fully with the agencies of government concerned with the determination of defense requirements and the means of meeting them. When the National Defense Commission was established in 1940 oil's position as a material essential to the country's security was recognized by the appointment of Dr. Robert E. Wilson to the post of petroleum advisor. Under his direction a survey of refining and transportation facilities was conducted and suggestions arrived at in agreement with Army and Navy officials for increasing the production of aviation gasoline and fuel oil and enlarging the quantities held in storage received the prompt collaboration of the industry. At that time, it must be remembered that the program of the American government was a purely defensive one limited to preparing the country to resist possible attack. It contemplated nothing more than the provision of equipment and supplies for a larger Navy, a greatly expanded air force and an Army sufficient to resist invasion. For these purposes it was held that no more than a rearrangement of then existing petroleum facilities was needed and the Defense Commission reported that even a major war effort would require no more oil than a normal two year increase in domestic consumption. The Commission held however that long range planning would call for a considerable expansion of refining facilities for the production of aviation fuel. Washington authorities felt that it was unnecessary for the government to participate in projects for the realization of such aims but certain oil companies on their own account undertook the construction of high-octane, alkylation and toluene units and work was started on two plants for the production of synthetic rubber. Though there was no assurance of a market for their products private enterprise, as in many other instances, anticipated needs that shortly were to become acute.

Early in 1941 the situation entered upon a new phase with the adoption of the Lend-Lease program for supplying food, munitions and other supplies in unlimited quantities to the nations opposing the Axis. This meant a great increase in the demand for aviation gasoline, fuel oil and lubricants for shipment overseas. By its departure from the strict neutrality previously observed by the United States, it brought the country nearer to the direct involvement in the war which was coming to be regarded by most informed persons as inevitable. In May of that year the President declared the existence of a national emergency.

Left: Oil men do a tour of duty at Fort Belvoir.
Below: Scrap rubber drive collected huge stocks for reclamation.

World's greatest tanker fleet is building.

On the day following this declaration he designated Secretary of the Interior, Harold L. Ickes as Petroleum Coordinator for National Defense. The President's directive called for "the development and utilization with maximum efficiency of our petroleum resources and our facilities, present and future, for making petroleum products available, adequately and continuously, in the proper forms, at the proper places and at reasonable prices, to meet military and civilian needs".

Actually the charter granted to the Petroleum Coordinator was not so broad as the above language would indicate. Determination of prices was placed under an entirely separate agency and control over materials needed to enlarge the facilities of the oil industry was lodged with the Office of Production Management which later was succeeded by the War Production Board. Within these limitations, however, the Coordinator set to work vigorously to carry out his appointed task. He organized an administrative staff composed of able men drawn from the ranks of the oil industry. He summoned oil executives to a conference and announced that his policy was to be one of cooperation and not dictation. He obtained a ruling from the Department of Justice that collective action among members of the oil industry where necessary to serve national needs would not subject them to prosecution under the anti-trust laws. The attitude and actions of the Coordinator allayed the suspicions of government domination aroused in the minds of many oil men by his appointment and the two groups have worked together effectively ever since.

Events had shown by this time that earlier estimates of aviation fuel requirements had been too low to meet the demands now coming into sight and one of the first requests made of the refining industry by the Petroleum Coordinator was for a doubling of existing capacity, shortly amended by a proposal that it be trebled. This was a large order but the oil companies responded by producing plans for an expansion of plant facilities to cost upward of $150,000,000 most of which was provided by the companies themselves.

Another problem assuming serious proportions was that of transportation, more particularly the movement of oil from the Gulf Coast to the Atlantic Seaboard. Withdrawal of tankers, fifty at first and subsequently fifty more, from this service in order to move a larger volume of oil products to Britain threatened a shortage for civilian use in the country's most important industrial area. A group of oil companies offered to build two through pipe lines from Texas to the Atlantic Coast but the Supply Priorities and Allocations Board refused to allot the steel needed for their construction and later denied a request from the Coordinator for a single cross-country line. Demands for steel to be used in shipbuilding, in the erection of war plants and in the production of guns, tanks, planes and other war materials were growing at a tremendous rate that threatened quickly to outstrip mill output and SPAB decided that these claims should take preference over pipe lines or oil production. As a result drastic limitations were imposed upon drilling while in the East deliveries of gasoline and fuel oil were cut down and service stations were allowed to remain open no more than twelve hours daily. Rising costs and restrictions upon movement and sales brought requests for permission to raise prices in order to avoid operating at a loss but instead the Office of Price Administration ordered a rescinding of advances that had been made in certain sections and followed this up by freezing all prices as of October 1, 1941.

When the members of the oil industry assembled at San Francisco in November 1941, therefore, they had gained a partial view not only of the added responsibilities which they were expected to assume but also of the difficulties and handicaps under which their future operations were to be conducted. Nevertheless they loyally and cheerfully subordinated their own troubles to the promise that their full resources would be devoted to the nation's service. By that time the emergency announced earlier in the year had grown to serious proportions but one month later its gravity was vastly intensified by the Japanese assault on Pearl Harbor, signalling the decision of the totalitarian powers to extend their war of conquest against the United States.

Pearl Harbor changed the picture completely. It meant a tenfold increase in fighting aircraft, a swift acceleration in the building of a two-ocean navy, the creation of a great army and its equipment with every mechanized tool of destruction that would enable it to pursue the enemy overseas and bring about his military annihilation. This meant in turn that oil was to play a vital part in the operations of all these forces, that petroleum products were to be poured out in quantities never before dreamed of and that all previous calculations of war demands upon the industry must be discarded in face of the new and greater necessities now placed before it.

By a remarkable coincidence, Secretary Ickes had

summoned a newly established consultative body, the Petroleum Industry Council for National Defense (a title quickly changed to Petroleum Industry War Council), to meet with him on the day following the Japanese attack. This meeting enabled the industry to move immediately to meet the new situation confronting it and it marked the beginning of the most intense period of building activity that the oil industry ever has experienced and one that can be matched only by some few other American businesses transformed by the exigencies of the situation into war industries.

An immediate problem was to provide for a greatly increased production of 100-octane gasoline. Plant capacity to produce 150,000 bbl. daily by midyear 1943 was projected. It was felt, however, that a much greater output than had previously been planned would be needed before new plants could be built and equipped. Refinery experts summoned to Washington worked out plans in conjunction with the Refining Division of the Petroleum Administration for War (new name for the former Coordinator's Office), which were effective in raising the production of this vitally important fuel to three times the 1940 level before any of the new plants came into operation. This was accomplished by making full use of crudes suitable for base stocks and enlarging the supply of blending agents through processes already known and established. Widely separated refineries were put to work producing the particular constituents of 100-octane gasoline for which they were suited and these materials were shipped to points where they could be combined into the finished product. This unspectacular and little publicized procedure was one of the highly important achievements of the early period of United States participation in the war and constituted the "miracle of high octane production" to which Secretary Ickes paid tribute in his book "Fighting Oil".

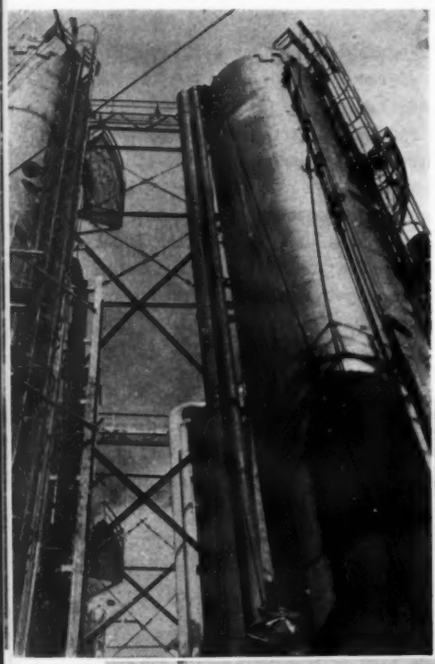
Two difficult and unexpected tasks were placed upon the industry during the early part of 1942. The Japanese sweep through the South Pacific had shut off the supply of crude rubber of which the United States imported 500,000 to 600,000 tons yearly from the Malay States and the East Indies. To a country in which travel and transportation depend largely upon motor vehicles rubber is a primary essential and means had to be found at once to provide an acceptable substitute for the natural supply that was no longer available. Fortunately the petroleum industry had both the material and the knowledge needed to meet this situation. Butadiene, a petroleum derivative, formed the principal ingredient of Buna S, the most satisfactory synthetic rubber for most purposes, and plants for the production of this and other forms of rubber had been built and put into operation. They were small, the total capacity being only about 30,000 tons per year, about five percent of the country's annual requirements, but they formed a nucleus on which an entire new industry was quickly built. The government, through Defense Plants Corporation, undertook to finance the erection of plants for synthetic rubber production, the War Production Board promised priorities on the critical materials of construction and a program was laid out providing for over 800,000 tons of synthetic rubber or more than the highest amount consumed by the country in any peacetime year. To supply the raw materials for this huge output the oil industry was assigned some 75 percent while the remaining quarter was to be obtained from alcohol. To date some thirty butadiene and styrene plants have been constructed or are approaching completion and assurance has been given that beginning with 1944 the country's indispensable rubber needs will be met without the necessity for importation.

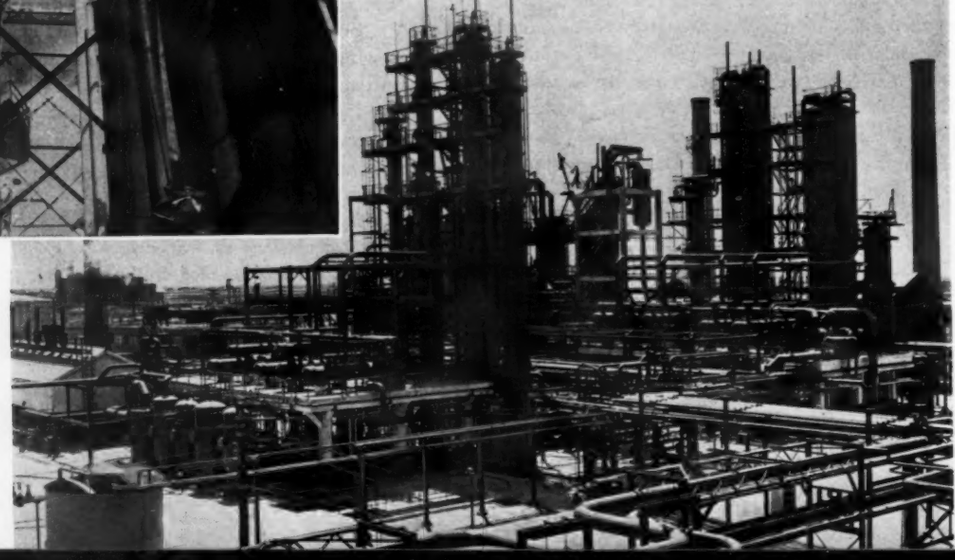
Another hugh task was that of completely transforming the transportation system for moving more than 1,500,000 barrels of oil daily from the mid-continent and Gulf Coast to the Eastern states. The tanker service which had moved 95 percent of this oil was suspended because of enemy U-boat depredations and the necessity of using the tankships in other areas. To replace these facilities every obtainable tankcar was pressed into service, existing pipe lines were rearranged or had their flow reversed and the movement of oil by barge was largely increased. Finally, in June 1942, the War Production Board, gave its approval to the construction of a pipe line two feet in diameter from Texas to Illinois and later authorized its extension to the Atlantic Coast. The building of this line, the world's largest, with a capacity of 300,000 bbl. daily, was carried out by an organization drawn from the oil industry and was an epic achievement in construction. The main line, 1,381 miles in length, was laid through swamps, over mountains and across rivers, despite floods and storms and the worst of winter conditions and was completed in 350 days. The men who built it are now pushing through a second line 20 inches in diameter following practically the same route. The two companies will move over 500,000 bbl. of oil daily and with the other measures adopted will deliver to the Atlantic Seaboard a greater volume of oil than it ever received by the tanker route.

In the provision of facilities required for the conduct of the war the oil industry has had the financial backing of government agencies when this was needed but it also has expended hundreds of millions of its own funds in order to increase the supply of war products. The great new pipe lines built to carry oil to the East are government-owned but industry-operated. Most of the plants producing materials for synthetic rubber have been financed by the government's Defense Plants Corporation. On the other hand, something like 75 percent of the cost of the all-important high-octane gasoline program has been borne by individual oil companies. Out of the $2,000,000,000 invested in war expansion in the petroleum field, probably $1,250,000,000 represents public funds and $750,000,000 private capital. Industry expenditure for this purpose is still growing.

Along with these gigantic undertakings the process of streamlining the oil industry for war service went forward uninterruptedly. The high-octane program was upped repeatedly as war demands rose. More refineries were equipped to produce toluene, benzene, isobutane and codimer. With limitations placed upon the civilian use of gasoline refining practice was revised to reduce gasoline output and to provide more fuel oil for naval and merchant vessels and for industrial use. To make the change from the more profitable motor fuel to the less remunerative fuel oil involved a financial sacrifice on the part of refiners but it was made without question, and later on the government undertook to make equalizing payments to cover the difference.

Characteristic of the spirit in which the oil industry subordinated its private interests to the furtherance of the war effort was the nation-wide





Left: Lofty towers of Texas butadiene plant.
Below: Many new plants produce 100-octane gasoline.

Celebrating completion of "Big Inch" Pipe Line.

campaign carried on to impress upon the public the importance of conserving gasoline and tires. Under the twin slogans, "Oil is Ammunition—Use it Wisely" and "Care for your car—For your Country", oil companies devoted millions of dollars worth of advertising space and radio time to urging the greatest possible reduction in the use of cars, employing for this purpose the same media previously used to promote the sale of their products. Latest of these campaigns has been one to encourage tire conservation using the slogan "Recap and Roll."

While carrying on the greatest construction activity in its history, the industry had to cope with a scarcity of many of the materials it had been accustomed to employ. Steel, copper and various alloys were severely restricted and it was necessary to resort to substitute materials and incorporate used equipment in building many of the units built to provide products for the war program. Refineries which were approaching obsolescence or were so located that they could not contribute effectively to this program were dismantled to provide parts; scrap piles and the warehouses containing spare parts were ransacked to obtain pumps, valves, compressors and other kinds of equipment, each company providing whatever it could dispense with. Out of this mutually helpful effort some remarkable results were obtained in the way of highly efficient plants built with a minimum of new materials.

At the same time the industry took a leading part in the various campaigns for the collection of discarded metals and other materials for reuse in feeding the war machine. One of the most important of these campaigns was initiated, managed and brought to a highly successful conclusion by the oil industry acting under the direction of William R. Boyd, Jr., chairman of the Petroleum Industry War Council and other officials of that body. This was the drive for the collection of scrap rubber to supplement the country's crude rubber stocks in the period while plants to provide synthetic substitutes were still in the blue print or construction stage. Every service station in the country became a focal point for the collection of all kinds of old rubber and a nation-wide publicity campaign was organized to interest every business organization and every household in the effort. Members of the industry donated their services to the work and oil company trucks hauled the collected waste rubber to shipping points. As a result of six weeks of intensive work 463,000 tons of rubber suitable for reclaiming was collected and the penny a pound profit paid by Rubber Reserve Corporation enabled the industry to hand over to the Red Cross and other service agencies the tidy sum of $2,000,000.

From the time when the United States became a full-fledged participant in the world struggle and even during the emergency period preceding, attention was concentrated on the urgent task of supplying increasingly large quantities of petroleum products for war use to the relative neglect of the ultimate source of such supplies in the form of crude oil. During many years the oil industry had been able not only to satisfy a rapidly rising demand for its products but by the expenditure of millions of dollars annually on surveys and exploratory drilling had built up a constantly growing accumulation of known underground reserves calculated as amounting to 20,000,000,000 bbl. by the beginning of the present year. Within the past few years the rate of discovery has slackened, the size of new fields opened has grown less and the cost of exploration has risen sharply. With the advent of the war and the added demand resulting, the industry has entered a new phase, that of higher production, lowered discovery, a condition that is bound to result, if continued for any considerable period, in the depletion of the industry's real capital and the exhaustion of a natural resource upon which the national welfare depends.

This question of maintaining reserves at a level high enough to sustain the higher rate of production demanded by the war and by post-war conditions is one that is of primary concern not only to the oil industry but also to the economic well-being of the nation. It is directly involved with the question of price. Past experience has shown that exploration and discovery are closely related to the price of oil, a natural condition since the inducement to venture capital to engage in oil search obviously becomes greater when the reward of a successful result is attractive and disappears as the prospect points increasingly to the loss of the capital invested. Under normal relations of supply and demand, the price of oil would have advanced in conformity with the prices of other commodities with the advent of war and would have supplied the incentive for the more intensive exploration necessary to replenish underground reserves at least in pace with withdrawals. While this remains the most critical of the country's oil problems, it is one which the industry itself is unable to solve since the regulation of oil prices is in the hands of the office of Price Administration which has fixed them at the low level of October 1941. Of all the industries producing materials essential to the conduct of the war, oil is the only one that has been required to accept prices for its products which require large sections of the industry to operate at a loss.

In the early discussion of possible emergency needs, it was taken for granted, both by military authorities and by many oil men, that production would take care of itself. The Defense Advisory Commission, as mentioned previously, held that "a major war effort" would require no more oil than would equal a two-year normal increase in domestic consumption. Translated into specific figures this would have meant perhaps 300,000 bbl. daily whereas in reality war requirements already amount to four times that amount and are growing each month. The finding of more oil is one of the urgent tasks before the country and is one that the oil industry will undertake as soon as the government's price agency permits the establishment of conditions that make this possible.

Despite the price handicap, the reduction through rationing of the sales of its more profitable product, its heavy loss of manpower, the disruption of its marketing organization, and many other difficulties the oil industry has not failed to meet every critical war demand made upon it. It has filled heavy and unexpected requisitions from the military authorities whenever and wherever these have been presented, has maintained allied superiority in the air, and has made good its promise that no ship should fail to sail and no tank be unable to roll for lack of oil. Its members have made good in every way the pledge offered when America stood on the threshold of war and have done this without regard to the effect upon their own fortunes.

Petroleum Products Serve on the Fighting Fron

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1. *In the South Pacific—Gasoline for the Solomons.*

2. *U. S. Bombers Blasting Ploesti Refineries.*

3. *Supplies for Russia, at a Caspian Port.*

4. *The Jeep Has Won Distinction in the War.*

5. *Unloading Gasoline Trailer, Iceland.*

6. *General Grants Moving to Battle in Libya.*

7. *P-38 Fuels at an Australian Field.*

8. *Discharging Gasoline Cargo in New Guinea.*

9. *Gas Depot Behind the Lines in North Africa.*

10. *Montgomery Rides into Sicily in a "Duck".*

11. *Tank Cars at a Camp in Australia.*

12. *Moving U. S. Army Supplies in India.*

13. *Lend-leased to an Allied Nation—a Tank Starts to War.*

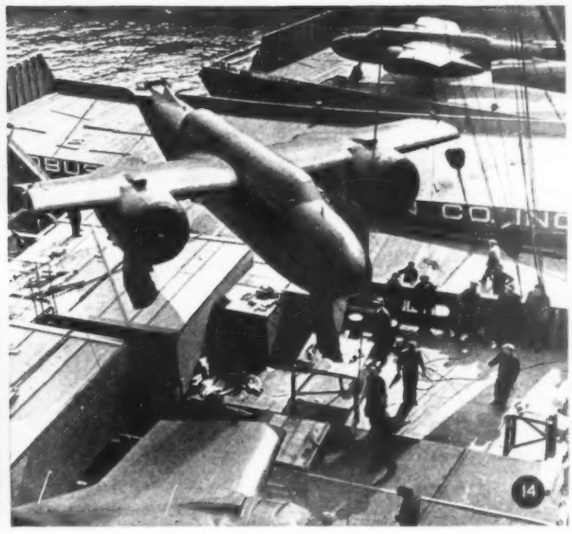
14. *Loading Bombers for Service at Far Distant Front.*

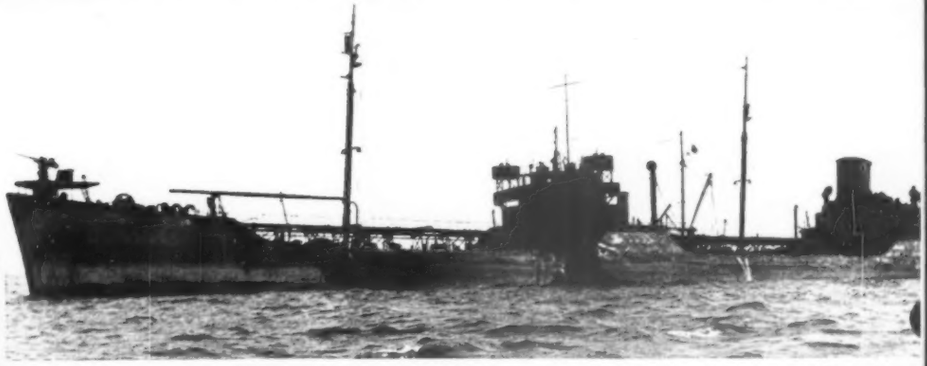
15. *Servicing a Flying Boat at Coco Solo.*

16. *With a Gaping Torpedo Wound this Tanker Reached Port.*

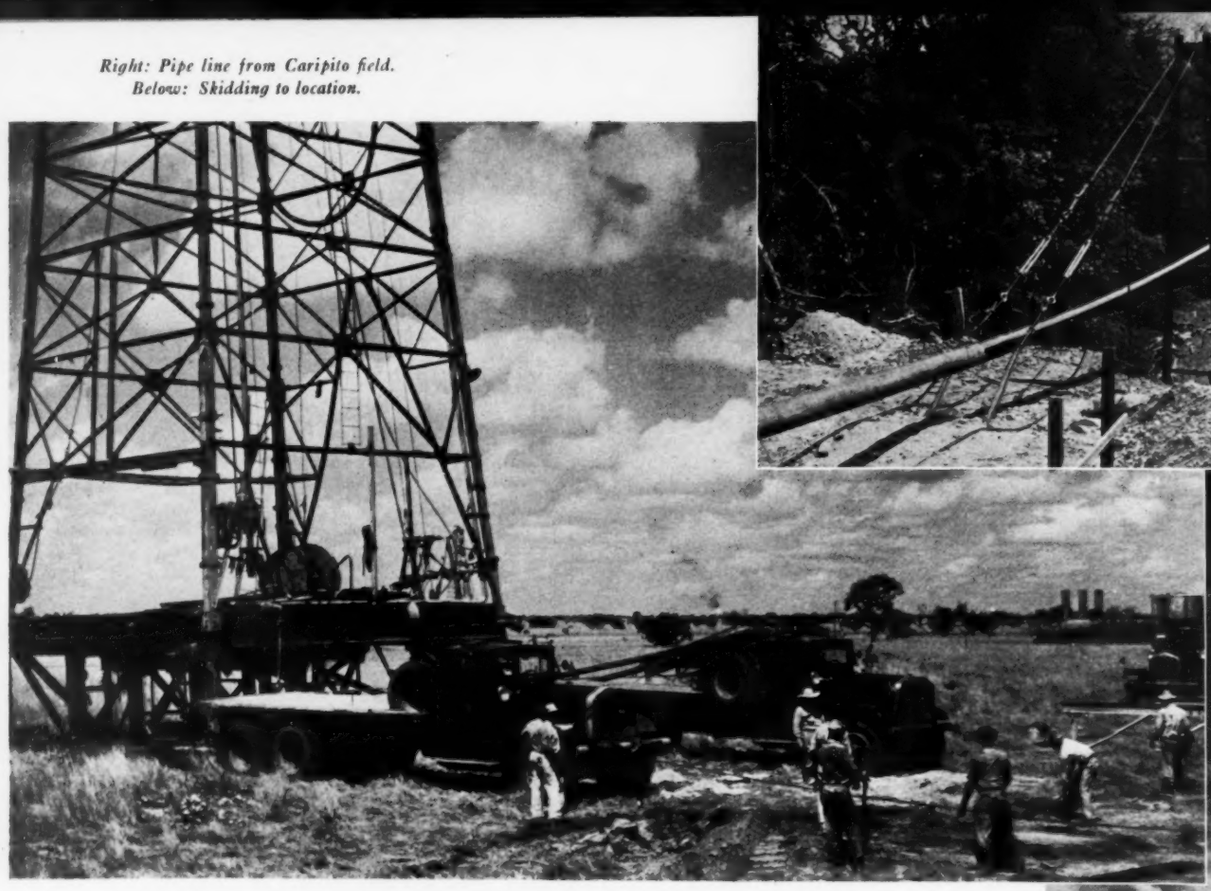
17. *Manpower Moves Gasoline to a Pacific Flying Field.*

18. *Gas Feeds a Truck in Burma.*





Right: Pipe line from Caripito field.
Below: Skidding to location.



VENEZUELA PREPARING FOR INCREASED PRODUCTION

By Ruth Sheldon

Expansion Already Underway but Rise Expected to be Gradual Because of Various Factors Including Limitations on Supply of Drilling Equipment—Oil Companies Busy Adjusting Holdings to Provisions of New Law.

CARACAS, Venezuela—While Venezuelan oil production has increased recently, rising to 650,000 bbl. daily in the past few weeks as compared to an earlier output of from 350,000 to 400,000 bbl., this in the main reflects an improvement in the shipping situation. With more tankers available and comparative freedom from submarine molestation, at least for the time being, it has been possible to move more crude oil to Caribbean refineries and more products from these refineries to destinations overseas. This has permitted the opening up of some wells that had been choked back to a very low daily output and if favorable transportation conditions continue, a further gradual rise in production may be expected.

Even with ample cargo capacity and continued immunity from enemy attack it will take some time to get back to the pre-war level of production which was 100,000 to 150,000 bbl. above the current out-turn. This is not because the oil is not here but because the means of locating it, bringing it to the surface and transporting it to shipping points are lacking.

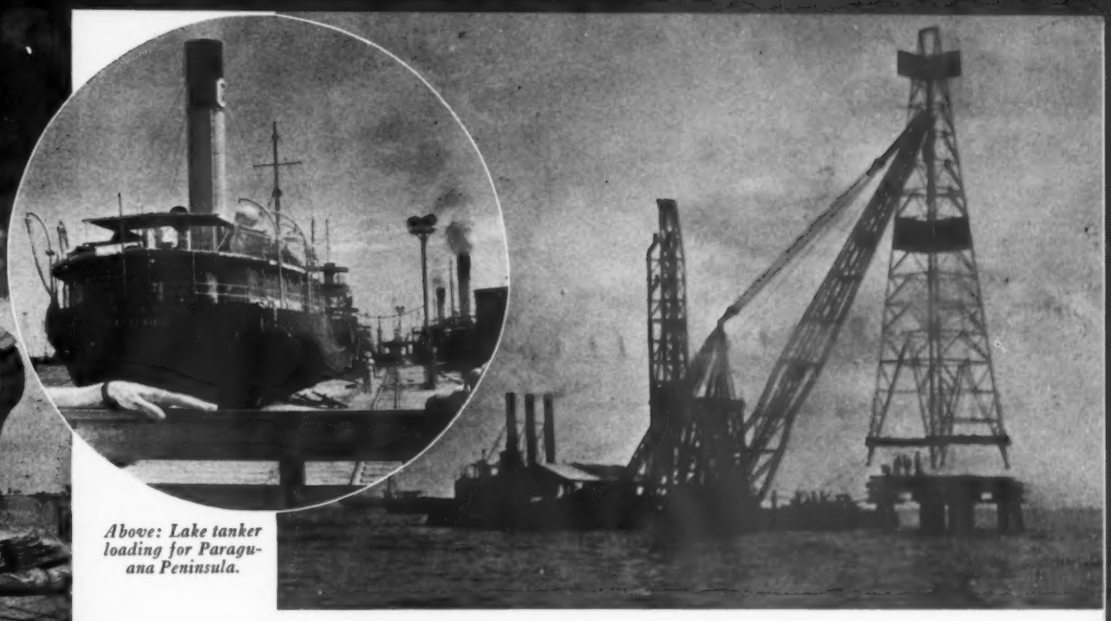
Reports which seem to have been rather widely published in the United States to the effect that Venezuelan production will be raised to a million barrels daily by the early part of 1944 are received with some surprise and incredulity when brought to the attention of oil men down here. They would like to be able to confirm these statements but find no substantial basis on which to do so.

Considering that Venezuela is the second largest oil producing country in the world relatively little drilling activity is under way. Only eighteen wells are being put down at the present writing. Of these only four are wildcats. Two-thirds of the drilling in progress is taking place in Eastern Venezuela where the light crude especially desired for war purposes is found. The drilling programs of the various companies operating in Venezuela, the larger ones being Standard Oil (N. J.), Shell, Gulf and Sinclair, for the rest of this year and for 1944, contemplate only a moderate increase in activity as they stand at present. Authorization has been granted for the shipment of a limited amount of drilling equipment and several additional strings will be put in operation as soon as this machinery arrives. All the larger companies contemplate some increase in activity but most of the men with whom this correspondent has discussed the subject feel that an additional 100,000 to 150,000 bbl. daily is about as much as can be anticipated from present indications.

Derrick on a drilling well—cementing unit on wheels.

Aside from the question of equipment, there are several factors that militate against the rapid expansion of production. Geological and geophysical exploration has been more or less at a standstill for the past two years, partly because of the lack of crews available for this work but largely because the impending change in the oil law and uncertainty as to the situation that would result from it led the oil companies to go slow in this direction. During the time when producing wells had to be shut back because of lack of transportation there naturally was little inducement to extend the sources of supply. Many members of the technical staffs, especially North Americans, have left the country to enter military service or to take the places of others called to join the armed forces. It will take time to reorganize these forces and resume large scale operations.

Determination of the rate at which the mechanical requirements of expanded production can be met



Above: Lake tanker loading for Paraguana Peninsula.

Right: Setting a derrick in Lake Maracaibo.
Left: Rotary table, tongs and slips on a drilling well.

actually rests mainly with governmental agencies in Washington. The United States is the only country under present conditions that can supply power equipment, drilling machinery, drill pipe, casing and other essentials of exploration and production. Manufacture of such equipment is dependent upon specific authorization by the War Production Board and its shipment outside the country requires special export licenses and shipping permits. While the Washington authorities are not unsympathetic to the needs of their American neighbors the demands upon steel and other critical materials for direct war supplies have been so heavy that very little has been allotted to other purposes.

Should the need of additional oil to meet military requirements of the United Nations become so imperative as to make larger production in the Caribbean area an actual war necessity as seems now to be the view in many quarters the decision might be reached to release whatever materials and men are considered necessary to accomplish this result in the shortest possible time. In that event, a substantial speeding up of Venezuelan production could be accomplished and both the government and the members of the oil industry here would join wholeheartedly in any such movement. Unless some such action is taken the process of expansion will have to follow a more gradual course.

For months past oil company staffs have been mainly occupied in making adjustments called for by the new oil law of March 13, 1943, and this condition will prevail for some time to come. As previously stated, exploration and development had reached practically a standstill while the law was in process of being formulated. When finally adopted its terms provided an acceptable and amicable adjustment of the points at issue between the government and the industry but it also imposed a tremendous task upon the representatives of both. All the companies established in Venezuela faced the necessity of converting their old concessions to the new law and obtaining new titles for forty more years. This involved a tremendous amount of paper work with unavoidable red tape on the part of both government and companies. Some 15,000 titles had to be converted which required checking in detail maps, surveys, deeds, and other documents. Each title must be written in long hand, under Venezuelan law, before it can be officially registered.

The enormity of such a task is exemplified in the case of Shell which has some 6,000 titles to register. After the titles written in long hand are registered they are published in printed form in the Official Gazette. The company estimates that for their 6,000 titles alone it will take eight publications of the Official Gazette of 500 pages each.

Both oil men and government officials anticipate a long period of writer's cramp in signing each of the many documents. The president of one company plans to alternate, in two hour stretches, with two officials who have powers of attorney. The Minister of Fomento, Dr. Gustavo Herrera, must sign 15,000 documents. Dr. Luis Herrera Figueredo, Technical Director of Hidrocarbons for the Ministry has no pleasurable anticipation in looking forward to the fact that he must sign his name 45,000 times.

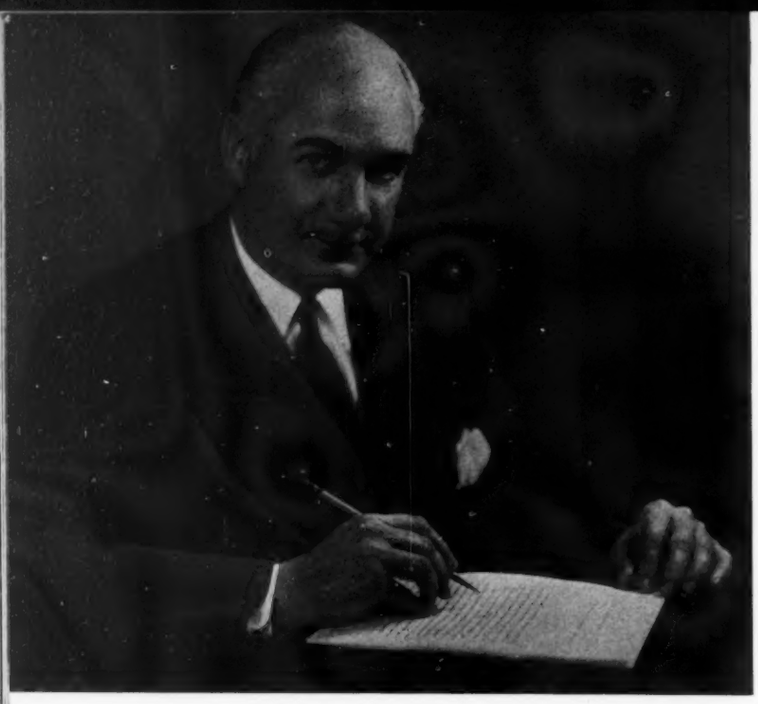
The Ministry of Fomento hopes to have the conversion of all titles completed by February, 1944. It contemplates hiring 30 additional employees in order to cope with the tremendous amount of work. Naturally, both the government and the oil companies have been so absorbed in this conversion work that there has been little time for initiating new development programs. No new concessions have been granted yet, although a number of oil companies from the United States have sent representatives to study the possibility of their entering the Venezuelan oil picture. Among these new companies are Superior Oil of California, Union Oil, Standard Oil of California and Phillips Petroleum.

One major problem which developed after the passing of the new law is being satisfactorily solved. The new law prohibited the oil companies from importing materials and necessities duty free, with the exception of drilling material, as had been their privilege in the past. The Venezuelan import duty law is extremely antiquated as it provides for duties to be paid on the basis of weight. President Medina has appointed a special commission to revise this law but the revision will not be finished until Congress meets again in 1944. In the meantime, the oil companies would have suffered severely from being required to pay duties on the basis of weight, oil field equipment being what it is.

Consequently, the Minister of Fomento agreed to work out with the oil companies a special series of decrees to be submitted to President Medina which would provide for reasonable duties to be paid on the various types of equipment necessary to import. These decrees have been successfully worked out to everyone's satisfaction and there is no doubt that the President will issue them shortly.

The solution of this particular problem is an example of how successfully the new law is working out. Due to the spirit of amicability and goodwill which the new law engendered in both companies and government and the proof which it provided that government and industry can equitably solve their problems through mutual cooperation, there are no new problems which arise which are not being handled in the same spirit in which the law was conceived.

Some oil men were dubious at the time of the passage of the new law that matters would really work out, but now, six months later, there is not a single oil man or government official who is not enthusiastic about the way in which industry and government are working together in Venezuela.



J. E. Brantly

APPARENT RISE OF OIL INDUSTRY EARNINGS ILLUSORY

By J. E. Brantly and Moultrie Hitt

Producers Operating on a Liquidating Basis—Alleged Gain Represents Fund That Normally Would Be Expended on Exploration to Build Up Reserves for Future Use.

SINCE the effective development of the internal combustion engine forty-odd years ago, made possible by the somewhat earlier discovery of petroleum and its resultant fuels and lubricants, the economy of this nation has become increasingly dependent on and promoted by that great transportation system the units of which move on highways. Until the period immediately following the first World War, steam and electric railway systems were being vastly extended to meet the requirements of our rapidly expanding population. Since that time many miles of steam railways and electric lines have been abandoned, owing to their inability to compete with the more flexible motor truck and automobile. Literally millions of miles of hard surfaced and graded highways have been constructed throughout the nation to accommodate these motor driven vehicles and to provide each community with ready access to all other communities. An increasingly important part of both freight and passenger traffic is being handled on this great highway system by thirty-odd millions of these trucks and automobiles. The older rail systems, in consequence, have been forced to the abandonment of vast quantities of rolling stock and a considerable relegation of horse drawn vehicles to the passing period has likewise resulted.

With the coming of World War II the manufacture and movement of material and men would have been impossible without these conveyances driven by petroleum fuels. The development of an army, a navy and an air force essential to national defense would have been difficult and the ability to supply these forces with their requirements would have been far less effective. The successful defense of the nation would have been problematical. We are now facing a declining rate of production of this so essential petroleum and we are not making sufficient provision for the increase of the producing ability of the petroleum industry, nor are we even making sufficient efforts to maintain its present producing capacity.

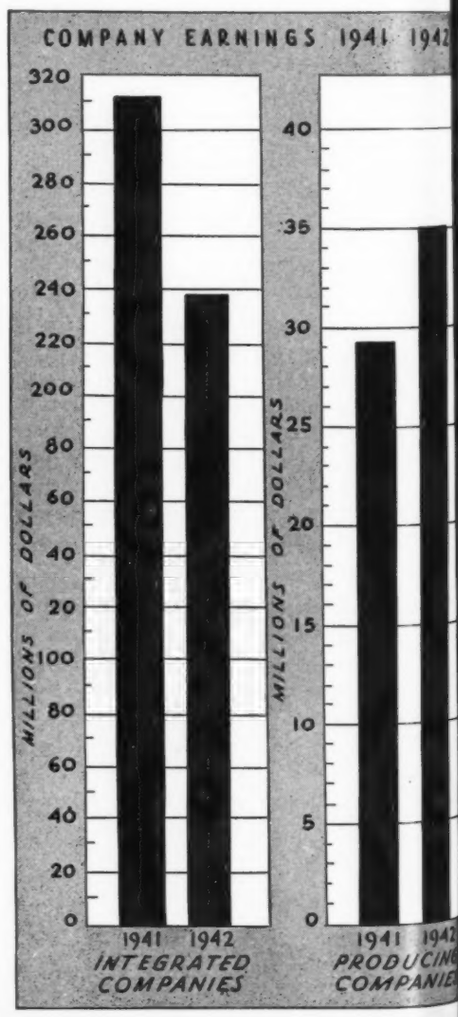
This nation has reached its point of eminence as the greatest industrial nation in the history of the world through its democratic government under which private enterprise has been allowed and encouraged. Successful private enterprise is dependent for its life and progress upon remuneration for its products sufficient to assure the maintenance of reserves of satisfactory quantities of the basic raw materials or natural resources on which all industry is dependent, as well as to manufacture the products therefrom.

In 1938 carefully calculated, carefully engineered estimates of the country's petroleum reserves indicated a quantity of between fifteen billions and sixteen billions of barrels. Up to that time new oil discovered by exploratory drilling had been generally sufficient each year to increase the known quantity. Since that year new discoveries have been insufficient to replace the quantities of oil produced and consumed. In 1941 the wells of the nation produced approximately 1,400,000,000 barrels of oil. During that same year exploratory or wildcat wells added an estimated 254,801,000 barrels*, to our reserve, showing a deficit for the year of 1,150,000,000 barrels. During 1942, under the curtailment of domestic consumption made necessary by the scarcity of rubber, a similar deficit occurred. As this year 1943 draws to a close it seems apparent that the deficit will be even greater. We are rapidly approaching the day when there must be additional reduction of domestic consumption not because of a scarcity of rubber as was the case in 1942, but because the actual production of crude petroleum is insufficient to supply the needs of the nation within its boundaries and the requirements of its armed forces fighting so valiantly throughout the battle areas of the world for the preservation of the nation and the way of life of its citizens.

The oil industry has the enormous responsibility of supplying the fuel and the lubricants that are essential to the movement of all mechanized equipment upon which the struggle for national existence depends and for supplying and transporting to our heavy transportation systems the supplies necessary to the successful use of this mechanized equipment and those who man it.

The oil industry is a great commercial enterprise built of lesser enterprises which produce from a few barrels of oil daily to hundreds of thousands of barrels daily. Without sufficient remuneration for its efforts, this vast enterprise can neither increase its potential production nor even maintain it.

In 1941, as already stated, the oil fields of the country yielded a total of approximately 1,400,000,000 barrels of oil. In payment for this production the industry received an estimated $1,700,000,000. During this same year 32,000 wells were drilled. Hundreds of thousands of acres of

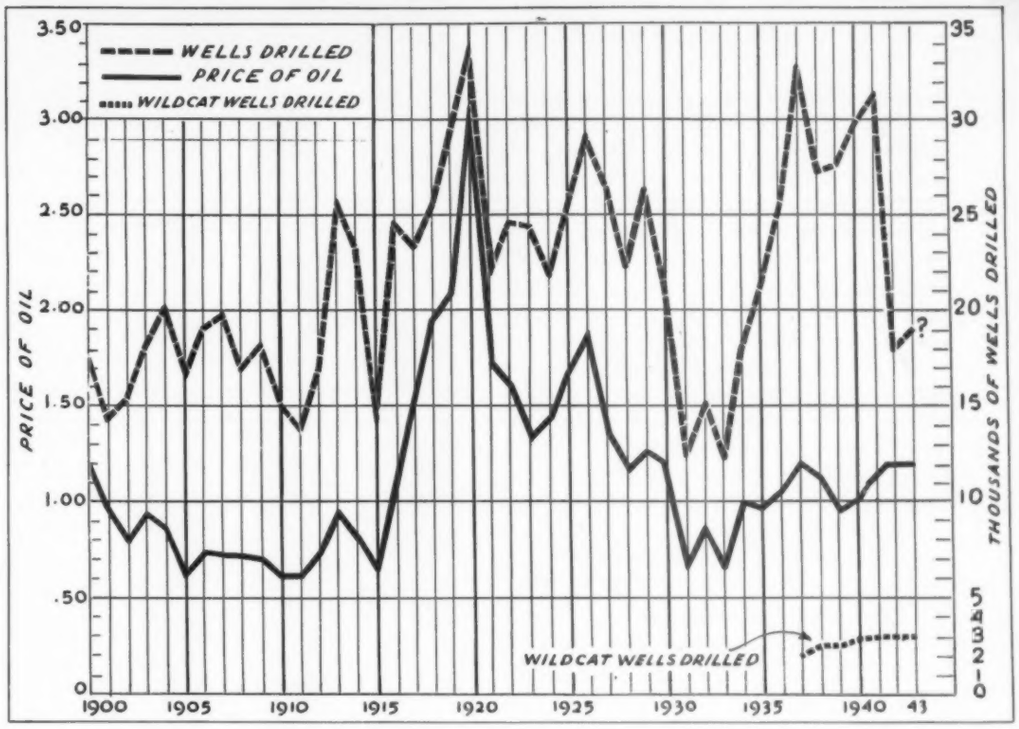


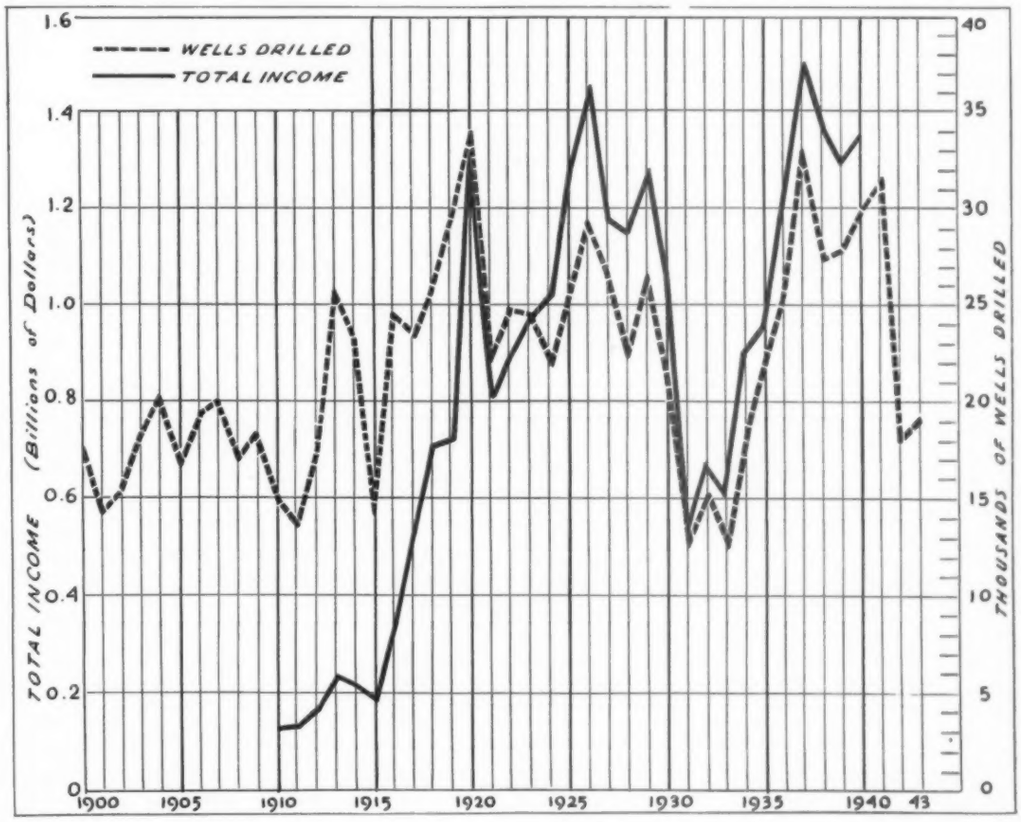
*Lahee, F. S., Bull A.A.P.G.

new leases were acquired and rentals were paid on millions of acres of old leases. Geological and geophysical parties were scattered throughout the regions of possible production and in finality these 1,400,000,000 barrels of oil had to be lifted from some 400,000 wells and placed in lease tanks. The cost of these enormous efforts of finding and producing oil may be reasonably estimated at $1,800,000,000, which is $100,000,000 in excess of the sum received for the oil actually produced and at the end of this year the capital assets of the industry in potential new reserves discovered were considerably less than the quantity of oil produced during the year. The fact that more dollars are spent in one year in finding and producing oil than are taken out in an equal length of time in the form of oil is quite contrary to the usual conception of the oil producing industry, but it is nevertheless true. It is accepted by students of the subject that in the history of the industry more money has been spent in finding and producing oil than has been realized by the producer for the oil when sold. This does not mean that all of the units of this great industry show deficits for a year's work, though many do while others go into their financial reserves or profits from other branches of the industry or other sources to support their operations. The profit made by the industry as a whole is represented by the oil in the reserves of proven and developed fields.

According to the United Press seven of the principal oil companies of this country earned $95,000,000 in 1940 and $140,000,000 in 1942, showing an increase of $45,000,000. These seven companies are all integrated organizations; that is, they have oil finding departments, oil producing departments, pipe line departments; they operate great refineries and market their products in both wholesale and retail quantities. If we assume that one-half of the profit earned by these companies, which is probably an unreasonably large part, was derived from crude oil produced, we find that these companies had an increased profit of some $22,500,000 from their oil producing activities for 1942 over 1940. These seven companies produce about 10 per cent of the oil brought to the surface in this country, which means, if these seven companies are average, that the entire oil producing industry on the face of the record showed an improvement of profit for the account of production by $225,000,000.

In 1942 the industry drilled 18,000 wells, which was 14,000 fewer wells than the number drilled during the preceding year. At an average estimated cost of $25,000 each, which is a conservative figure based on actual well cost data for wells drilled to average depths throughout the country, the industry spent $350,000,000 less for new drilling that it had spent during the preceding year. Of this $350,000,000 about $130,000,000 would have been accounted for as capital investment and the remaining $220,000,000 would have been written off as expense deductible before the calculation of profit. In addition to this somewhat less money was spent in the preliminary search for oil such as geological work, geophysical work and new lease acquisitions; also less money was spent for property rehabilitation because of a lack of materials.





These figures indicate that the apparent book profit of $225,000,000 is accounted for by a sum that would have been spent and deducted from earnings had there been no curtailment of tubular goods and supplies, which resulted in the drilling of little more than one-half the number of wells that normally would have been drilled. This is money that should have been put in the ground to replace as proven reserves that quantity of oil that was produced during the year. In 1942 and in this year 1943, and as a matter of fact for several preceding years, the petroleum industry of this country has been operating on a liquidating basis. Let us assume an extreme case. Suppose no wells had been drilled in 1942. The oil producing industry would have shown a profit on some 1,400,000,000 barrels of oil worth $420,000,000 at 30 cents per barrel without adding a single barrel to its depleting reserves. It would have been truly a liquidating industry. Obviously

there are companies which earn an actual profit by producing oil, otherwise we would have no industry, but during these years 1942 and 1943 a greater number have been producing oil as a liquidating asset or at an actual dollar loss if these companies intend to remain in business.

This apparent 1942 profit of $225,000,000 in excess of 1940 profit, as indicated by the seven companies referred to, was not an actual profit; it was money which should have been returned to the industry in the form of new wells, or it was money that should have been set up in an actual dollar reserve to be used for the drilling of new wells and the replacement of wasting petroleum reserves at the time when our war efforts would permit. Taxes were paid on this apparent or false profit.

The President in a recent message to Congress stated that since the outbreak of the war in Europe we have increased our petroleum production by 66 per cent. Official statistics do not support this statement. The U. S. Bureau of Mines estimates that in 1938 the nation produced 1,214,355,000 barrels of oil; in 1939 1,264,962,000 barrels; in 1940 1,353,214,000 barrels, and in 1941 1,404,182,000 barrels. In 1942 about 1,385,000,000 barrels were produced. At the present rate of production 1943 will see a probable total yield of approximately 1,500,000,000 barrels. During these same years it is estimated by Dr. F. H. Lahee (op.cit.) that we added to our oil reserves by new discoveries (not including revisions of previous estimates) the following quantities: 1938 805,293,000; 1939 337,989,000; 1940 280,882,000; 1941 254,801,000.

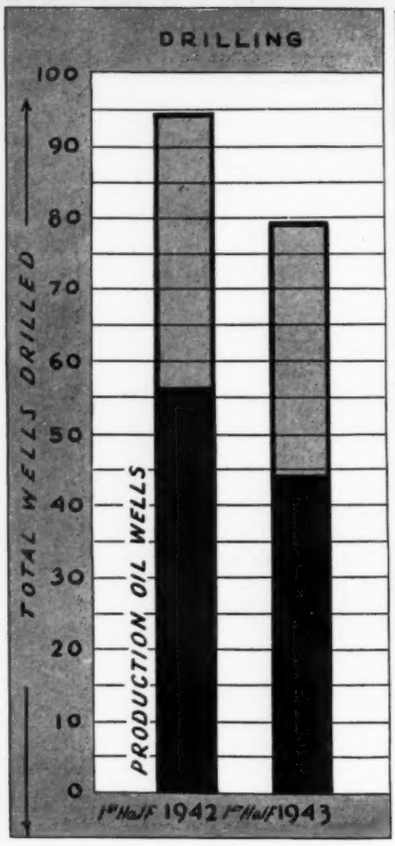
Another estimate* shows that over the five year period 1938-1942 we produced 6,620,000,000 barrels of oil and added 5,570,000,000 barrels to our reserves, showing a total deficit for five years of 1,050,000,000 barrels. This quantity is two-thirds of a normal year's consumption at the present rate. Since the outbreak of the war the petroleum output has increased by the normal rate that has obtained over the past ten year period and we have shown that our rate of discovery of new potential reserves has declined.

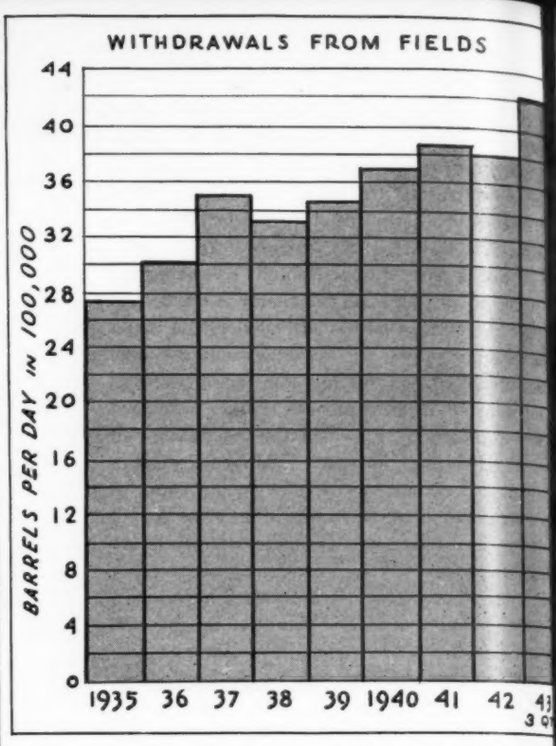
Actual apparent reserves have increased during the past few years, according to Lahee (op.cit.) but this has been through revisions of estimates of reserves already discovered and known and not by bringing new oil into them by wildcat wells.

The head of the petroleum section of the Office of Price Administration is opposed to an increase in the price of oil because the industry, in his opinion, is earning more money now than in 1940 or 1941. The information on which he bases this statement is incorrect in its full and final analysis, as already set forth. There has been and will be this year an apparent increase in profit in the oil producing industry, but this is due entirely to accounting practices which of necessity show as profit that money which should have gone into the ground for the replacement of oil produced. If we deduct the actual loss of the assets of oil in the ground it would be so reflected in the accounts of the industry as well as in its actual assets.

It has been stated, and correctly, that as many wildcat wells were drilled in 1942 and will be drilled in 1943 as during the years 1940 and 1941. This is true; but it is also true that instead of drilling the same number of exploratory test wells we should have drilled twice the number or more, if we expect to replace by newly developed reserves the oil that we are producing and consuming.

It is estimated, and reasonably, that the proven reserve of the country including revisions of old estimates total about 20,000,000,000 barrels. There are approximately 400,000 wells through which oil presently is being produced and there are a few thousand proven locations yet to be drilled. Within the past ten years, including 1943, an estimated 145,000 producing oil wells have been completed. Some of these flow their production while the remainder, probably one-half, have to be pumped. Between ten and twenty years ago an estimated 130,000 producing wells were drilled, a small number of which are still flowing while a much larger number are pumping. During the ten year period from twenty to thirty years ago some 168,000 producing wells were drilled and for the period between thirty and forty years ago some 145,000 wells were completed. All of the wells within this last mentioned twenty year period are pumpers. Prior to forty years ago (1859-1903) an estimated 155,000 producing wells were completed. This gives an overall total of about 740,000 producers, of which some 400,000 are still making oil. Many of these latter date back to the early years of the industry. The total number of all wells drilled since 1859 is estimated at 1,075,000 of which 235,000 were dry holes. By difference 100,000 gas wells have been completed.*





Above: War Increases Production Requirements.

Left: Drilling Activity 1942-43

If the additional presently proven locations were to be drilled and no more, it would require approximately as long to produce the 19,000,000,000 barrel reserve as it has taken to produce 28,000,000,000 barrels since 1859. This is about eighty-three years. Therefore, while we have an enormous proven reserve a great period of time, probably at least sixty years, would be required to produce this quantity from present wells only. During this period the industry could supply only a decreasing fractional part of our total requirements. We cannot produce oil in any quantity at will, but only as rapidly as the porous sandstones and limestones will give it up. There is no way to force the producing wells to supply the requirements of the nation when, considered as a unit, they once begin their long decline, which will doubtless be within the next few months unless additional great new oil fields are discovered.

For the week ending September 18, the entire industry of the nation produced oil at the rate of approximately 4,370,000 barrels daily. It is probable that we can increase this figure to 4,400,000 barrels daily, or even somewhat more, but to increase our daily yield beyond this figure

* Wiess, Harry C., Mining & Metallurgy (AIM&ME) Sept. 1943, page 390.

* Authority for figures in this paragraph: U. S. Bureau of Mines, American Petroleum Inst. and F. H. Lahee (opp.cit.).

we must of necessity withdraw from the more prolific and more active fields a greater quantity of oil than should be withdrawn if we are to observe conservative producing practices designed to recover the maximum eventual quantity of oil. It is extremely doubtful that daily production can be increased much beyond 4,400,000 barrels from present producing wells for a reasonable and useful length of time under any circumstances. The region from which the most production in excess of the present rate can be taken is West Texas and New Mexico, from which an extra 200,000 barrels daily, or possibly a little more, can be withdrawn, but it is doubtful that this additional yield can be maintained for a considerable length of time and even then it must take the place of production that is declining in other regions. Even now it is the opinion of petroleum engineers and geologists that the greatest field of them all, East Texas, is being produced at a substantially more rapid rate than should obtain if we are to recover the maximum quantity from it. The same is true of other great fields of the country such as Vacuum in New Mexico and many in California. We are wasting our assets of petroleum in the ground and if we do not discover more oil soon it will be necessary that we waste them at a more rapid rate in order that we may provide the absolutely essential requirements of our armed forces and of our domestic industry and agriculture.

The cost of finding, developing and lifting a barrel of oil increased more than 25 per cent between 1940 and September, 1943, and the trend is still upward. This was occasioned by increased labor and material costs, increase in the costs of various well and lease operations, less oil found per well drilled and normal declines in the producing capacity of old wells. Any industry in which the cost of production increases for approximately the same quantity of product sold for the same price must of necessity show a decline in profit. Almost throughout the life of the industry through 1941 a greater sum of money was spent in finding and producing oil than the actual dollar value of the oil produced. This excess of expenditures over recovery was accounted for by additions to petroleum reserves and by those who actually lost money in their oil field ventures. Had we shut down all drilling operations at the end of 1941, there would have been a dollar profit in succeeding years, but it would have been profit from a liquidating asset and at the expense of proven oil reserves.

The seven companies mentioned above showed an increased profit of $22,500,000 for 1942 over 1940 from all activities other than producing oil. A part if not all of this profit is abnormal and ordinarily would have been written off as expense for the account of rehabilitation and repairs of pipe lines, tank farms, refineries, transportation equipment, marketing facilities, higher marketing costs and many other items. The usual amount of money was not spent on these various items because of shortages of labor, scarcity of materials and government purchases. This unspent expense money is reflected in the accounts of the company as profit. It is not profit. It is money that should have been spent for upkeep and is balanced, or more than balanced, by a more rapid than normal rate of depreciation in the properties concerned. This money should be placed in reserve in a logical system of accounting to be used when materials and labor are available. Taxes were paid on this apparent profit.

Oil reserves of the United States are rapidly decreasing assets. The cost of production has materially increased. Reserves are declining by the failure of the industry to develop new oil in the ground commensurate with that quantity being withdrawn. The search for oil must be vastly increased and intensified. We have reached the logical peak of our production and within a few months, according to the judgment of the best informed, the maximum possible rate of production will decline. Our armed forces are increasing their demands. Our very nation has an economy built upon transportation by those vehicles using petroleum products. Unless our reserves are increased, unless we build up our capacity to produce more oil, either our armed forces will suffer for lack of petroleum products or domestic consumption must decline correspondingly; more likely both will occur.

We now require about 4,400,000 barrels of oil daily. After a few months we may require five million barrels daily. We cannot now, nor will we then be able to produce that quantity of oil. The nation is of necessity approaching a much more deeply curtailed domestic consumption. Our economy will of necessity be disrupted to a very substantial and possibly dangerous extent.

Part of this we could not have avoided regardless of the proven reserves, for the steel essential to the drilling of oil wells has been more essential in building battleships and guns; but we could drill more wildcat wells and bring more oil into the realm of proven reserves.

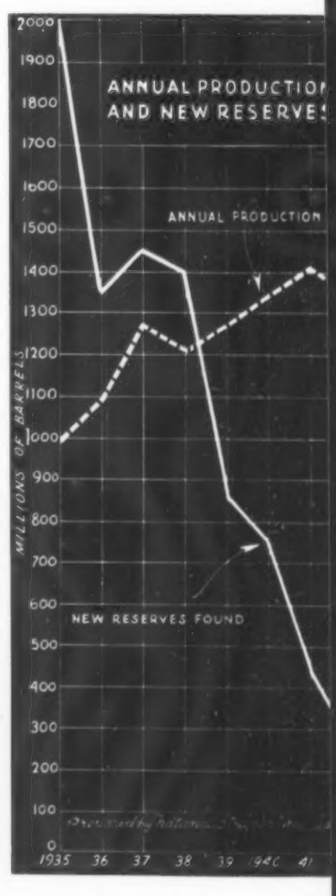
The oil producing industry as an industry is of necessity self-perpetuating, as are the individual units of that industry. They are controlled by men and groups who must, in order to exist, balance the income against the outgo. They must consider all phases of the producing of oil from the reconnaissance surveys of the geologists to its accumulation in lease tanks. At the present price of oil, it is impossible to make the books balance. The industry cannot increase its present rate of production, nor can that rate of production be maintained on the present crude oil price structure. An increase in the price of oil is absolutely essential to the life of the industry as it presently exists and to the safety of the nation and the comfort of its citizens.

There seem to be fears that some producers of oil will win an increased profit or a greater profit than is their just due. These fears are entirely unfounded on fact and logic. The income tax laws written by the Congress provide that no individual and no group shall under any circumstances or in any event earn and retain a profit in excess of that which is considered to be reasonable and fair. If these profits exceed eight per cent of the invested capital, if the operator has his income tax accounts set up on that basis, 90 cents out of each dollar of the excess goes to the support of the government. If the operator has his books set up on earnings base, 90 per cent of his excess profits will likewise go to the support of the government, if his earnings exceed the average for the years 1937, 1938 and 1939. In addition to this excess profits tax 40 per cent of the normal income is paid as taxes.

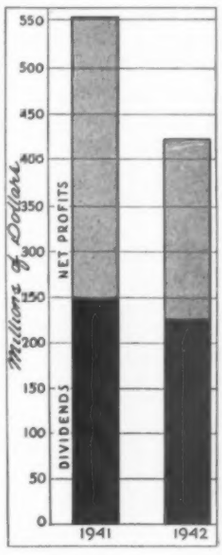
Thus it is evident that fears of unreasonable earnings are without foundation. The tax laws are such that they simply cannot be kept by the individual or company. but must go to the support of the nation. A crude oil price increase will be helpful to those who are not in the excess earnings bracket and will enable them to carry on their normal developments and normal explorations. It will be taken from those who are in the excess earnings bracket in the form of taxes. It will encourage others to spend more for the development of proven oil and the search for new oil. It will enable stripper wells to continue to produce for a greater length of time and will permit the rehabilitation of wells which are presently shut down. It will permit the drilling of known oil reserves which today cannot be drilled profitably at the present price of crude oil. These are not hypotheses, they are actual facts that can be substantiated and documented over and over again in all of the oil producing regions of the country.

(*Continued on page* 76)

Right: Demand Rises, Discoveries Fall.



Below: Decline in Company Earnings.



ECHOES FROM THE WASHINGTON OIL FRONT

By **W. J. Maddox,** Chief of Washington Bureau

Senator Lodge

DISCUSSION of oil, mostly foreign oil, spouted in all directions in Washington during the past few weeks. The eruption started following the return to the capital of the five Truman-committee Senators — Russell, Mead, Brewster, Lodge, and Chandler — from their globe-girdling tour of the battlefronts. In his first talk to the Senate following his trip, Senator Lodge gave special emphasis to the question of oil saying, "The information was repeatedly conveyed to me that the United States with less than 25 percent of the oil resources of the world was furnishing over 60 percent of the oil being used to fight this war."

President Roosevelt took prompt notice of this and other statements of similar import, told his press conference with some sarcasm that he never understood that the use of oil for war purposes should be determined by ownership but rather by where it could be obtained most readily.

Ickes Tells M.C.'s

PETROLEUM Administrator Ickes followed suit and explained to a delegation of Congressmen that oil from the Persian Gulf area "should and is being drawn upon" to fight the war. Furthermore, he assured them: (1) That everything necessary is being done to step up production and refining capacity in Arabia and Mesopotamia. (2) That "where we can", the United States is supplying materials for expanding foreign refining capacity, and WPB has allotted "considerable" steel for foreign use with Venezuela getting as much of this as PAW is able to supply. (4) That drilling in Mexico and Venezuela is being encouraged, that Venezuela's present production is 650,000 barrels a day, but by the end of 1944 it is hoped the output will be 1,000,000 barrels. (5) That we are using some of Mexico's output now and "will use more" although its 120,000 B/D production is little more than that country's own requirements.

Coordinating Allied Supplies

REGARDLESS of the flury caused by senatorial and other statements the Program Division of PAW and the Foreign Operations Committee are going quietly ahead with the survey of available supplies for Allied war use and the means of getting these to the places where they are needed, problems on which they have been working for a long time and which constantly present new angles as the battle fronts shift. Conferences with representatives of the British petroleum industry are practically continuous and it can be said without violation of confidence that the Britons, far from showing any reluctance at the employment in the war effort of the oil resources under their control, are eager to have these utilized to the fullest possible extent.

New Directive for FOC

THE Petroleum Administrator also has issued a new directive governing the activities of the Foreign Operations Committee and superseding those previously in effect. The change in effect gives the Committee full freedom to utilize petroleum supplies and petroleum facilities abroad without regard to ownership and to make arrangements for the pooling of supplies, equalization of costs and sharing of losses, all subject of course to the approval of PAW and the War Shipping Administration. This is simply another step toward the more extensive use of oil produced outside the United States wherever it is found that it will serve military needs with equal or greater advantage. Furthermore, it leads to a greater concentration of supervision over the movement of oil products to or from other countries. The committee handling shipments to Latin America will henceforth operate under the Foreign Oil Committee.

"Tankers Key", Says Davies

Ralph K. Davies

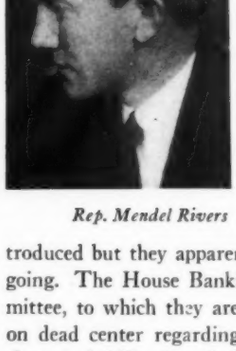
DEPUTY PETROLEUM ADMINISTRATOR RALPH DAVIES thinks the current stir over failure to use more Middle Eastern oil for the war puts the British in an unfair light—one that is not warranted. Tankers, he says, are the key to full utilization of oil supplies, and shortage of tankers has forced us to use oil from the shortest haul. For the European battlefront, this means oil from the United States and the Caribbean. The general impression, according to Mr. Davies. is that oil reserves in the Persian Gulf area are entirely British, while on the contrary American holdings in the Middle East are very large, almost comparable with the British. Also, contrary to public belief, much of the oil in South America is British-owned.

Oil Price Issue Grows Hot

Fred Vinson

DELAY in action on the much discussed advance in crude oil prices has generated much heat but little action. Oil-minded Congressmen, beseiged by their constituents, are fuming at the Administration's procrastination. Having "caucused" informally some 150 irate members sent a delegation of four to get a "yes" or "no" from Economic Stabilizer Fred Vinson who has the matter in charge. They returned with the assurance that he was "studying" the problem and that an answer could be expected "soon". Some guesses are that a nominal increase may be granted which will satisfy nobody.

Price Bills in Congress



Rep. Mendel Rivers

WHILE the Rivers Committee added its recommendation for a higher crude price to the many others that have been put on record many members of Congress have reached the conclusion that the only way to bring about a price advance is through legislation. Several more bills calling for an increase have been introduced but they apparently will encounter hard going. The House Banking and Currency Committee, to which they are referred, appears to be on dead center regarding oil prices. It now has three such bills pigeonholed.

Oil Import Figures

IMPORTS of oil to the United States which have not been published through regular statistical channels since the start of the war, were made known through the publication before the Rivers sub-committee of the House Naval Affairs

Committee of Price Administrator Brown's letter to PAW Ickes. These show imports of crude and residual fuel oils of 36,220,000 bbl. in 1940; 64,150,000 bbl. in 1941; 26,900,000 bbl. in 1942 and 4,470,000 bbl. in the first four months of 1943. Sumner Pike explained in some confusion his recorded statement before the committee that a billion barrel import next year was "logical" as a "slip" due to the fact that he did not understand the question.

Finis to Fuel Conversion

Chester Bowles

LITTLE by little the regulations intended to force the conversion of heating plants from oil to coal have been relaxed until last month the final step was taken with the announcement by OPA that industrial users would receive fuel oil rations irrespective of whether their plants were capable of conversion. As far back as the end of August a similar ruling was issued applying to oil for domestic heating. Householders with oil burning installations are even permitted to make replacements of their equipment—if they can find dealers or manufacturers able to supply it. Saddest fate is that of those who replaced their oil burners with coal furnaces at much expense and now find that they cannot obtain coal, many dealers declining to accept orders except from old customers. Wails and protests from these unfortunates deluge Chester Bowles and the members of OPA's fuel section. Apparently, there is little that can be done for these late comers. Fuel Administrator Ickes paints a dark picture of the coal supply situation and admits that production is falling behind week by week. OPA's explanation of its change of front is "a slight improvement in the oil supply, a dropping off in the coal supply and enough conversions to effect an annual saving of 70,000,000 bbl. of fuel oil". The agency congratulates home owners on their patriotic action in making this possible and these congratulations may comfort the heatless when frigid weather comes.

Pipe Line Progress

PLEASANTER reading is the report of the Petroleum Administrator that pipe line movement of oil to the East Coast has risen above 360,000 bbl. per day as compared with 66,000 two years ago. In a review of the pipe line program he points out that of eighteen major projects authorized thirteen have been completed. Out of 7,257 miles projected 5,721 had been laid by September 1, including 4,553 miles of new pipe and 2,478 of second hand. The estimated cost of the full program is $256,000,000 of which the government is to expend $187,000,000 and private industry $69,000,000. The latter figure, of course, does not include the many lines built by oil companies which are not a part of the main war program.

Who Are Making Money?

"INCOMPLETE and inaccurate", Beauford Jester, chairman of the Texas Railroad Commission, termed Oil Price Chief Sumner Pike's recent argument that a price increase should be denied because oil companies are making money. "It's my information", Mr. Jester told the House Naval Affairs sub-committee, "that he used the reports of some 30 major oil companies having production, pipelines, and refineries. These companies are making money out of the refined products. They buy all the oil they can get. Price is no object when they have contracts for war products. These companies buy the wells of independent producers at high prices to obtain needed oil. But the thousands of independent oil producers are not making profit if they are in debt for their drilling and operating costs. The stripper-well operators are actually losing money in producing oil at present prices. Many stripper wells have been shut in for that reason, and this is lost production."

Lea Committee Build-Up

Speaker Sam Rayburn

CONSIDERABLE parliamentary maneuvering seems to be necessary to get a price bill before the House. A move is now on to build up the Lea oil investigating committee, successor to the famous Cole committee, to a place where such legislation will be referred to it. The suggestion is attributed to Speaker Sam Rayburn. Whether it will be necessary to have the House grant the committee broader powers over oil matters is being studied. But members of the committee are proceeding cautiously, as they do not want to run into a jurisdictional feud with the powerful Banking and Currency group. However, this is something worth watching, and has possibilities.

Elk Hills Issue Fading Out

WITH a revised contract worked out between the Navy Department and Standard Oil Company of California, covering Elk Hills development, the agitation stirred up over the original deal has subsided and the projected Congressional investigation probably will fade out. Representative Peterson, chairman of the House Public Lands Committee, has decided not to reopen public hearings and not to press his resolution providing for subpoena powers, traveling expenses and counsel hire. He states that he will carry on his investigation privately for the present to see whether it will furnish him with stronger arguments for his resolution but the chances are that the subject will no longer be considered a live issue.

O'Mahoney Amends Bill

Senator O'Mahoney

SENATOR O'Mahoney's war minerals subcommittee returned from its field hearings on liquid-fuels-from-coal with some new ideas that have been incorporated in his bill S.1243, providing for government construction and operation of demonstration plants. The response encountered in the states visited, the Wyoming Senator says, was "little short of enthusiastic. Only one doubt was expressed, namely, that the authority might be used to put the government in competition with private industry. This was not the intention of the sponsors of the bill, nor of the Department of the Interior, and statements to that effect were made at the hearings." The Senator has amended his bill to make sure that there will be no invasion of private industry and no competition by the government with commercial enterprise.

Canol Investigation Demanded

CANOL emerged into the limelight again when Representatives Poulson of California and Gavin of Pennsylvania demanded an investigation of the Army's great project for oil production, pipe line and refinery construction in Northwest Canada. Their speeches were made in support of a resolution authorizing such an investigation. Congress usually is quite willing to approve inquiries into unusual government activities but in this case the claim that it might result in revealing military information may prevent or at least postpone action. Among other charges Congressman Poulson asserted that $100,000,000 had been spent on the scheme and a 500-mile pipe line had been laid over "extremely mountainous terrain" to move a production of only 3,000 barrels daily although it would have been much cheaper and easier to build a line connecting with the Alaskan reserve. A point he apparently overlooked is that an oil field has been in production for twenty years at Norman Wells while the existence of oil in the Alaskan reserve is still problematical.

PRELIMINARY PROGRAM AMERICAN PETROLEUM INSTITUTE

TWENTY-FOURTH ANNUAL MEETING

PALMER HOUSE, CHICAGO, ILL.

Tuesday, November 9, 1943, 10:00 AM

PROTECTION OF PETROLEUM FACILITIES

Wartime Facility Security: (Red Lacquer Room)

Presiding: George A. Hill, Jr., Houston Oil Co. of Texas, Houston, Texas.

Wartime Instruction and Training of Employees.

L. S. Wescoat, Chairman, PIWC Great Lakes Region Committee on Protection of Petroleum Facilities, Chicago, Ill.

Wartime Fire Protection.

A. A. Jergins, Petroleum Administration for War, Washington, D. C.

Wartime Protection of Petroleum Piers and Wharves.

Captain Norman B. Hall, U.S. Coast Guard, Washington, D. C.

Coordinating Wartime Internal-Security Programs.

Colonel George K. Engelhart, Provost Marshal General's Office, Washington, D. C.

1:30 PM

DIVISION OF REFINING

Wartime Cooperation: (Grand Ball Room)

Presiding: G. G. Oberfell, Phillips Petroleum Co., Bartlesville, Okla.

Technological Team Work.

T. G. Delbridge, Chairman, PIWC Technical Advisory Committee, The Atlantic Refining Co., Philadelphia, Pa.

Cracking-Coil Tubes at War—They Can Take It.

P. J. Harrington, M. S. Northup, and C. O. Rhys, Sr., Standard Oil Development Co., Elizabeth, N. J.

The Analytical Chemist on the Spot.

Harry Levin, Chairman, PIWC TAC Subcommittee on Analytical Methods, The Texas Co., Beacon, N. Y.

The Activities of the Aviation-Gasoline Advisory Committee.

H. G. Burks, Jr., Chairman, PAW Aviation-Gasoline Advisory Committee, Standard Oil Co. of New Jersey, New York, N. Y.

Oiling the War Machine.

G. R. Lord, Chariman, PAW Lubricating-Oil Advisory Committee, Sinclair Refining Co., New York, N. Y.

The Coordinating Research Council.

K. G. Mackenzie, Chairman, Automotive Research Committee, The Texas Co., New York, N. Y.

2:00 PM

DIVISION OF PRODUCTION

Internal Corrosion of Gasoline Pipe Lines: (Red Lacquer Room)

(Sponsored by the Topical Committee on Pipe-Line Technology)

Presiding: A. H. Riney, Phillips Petroleum Co., Bartlesville, Okla.

Suggested Formula for Calculating the Capacities of Products Lines.

T. R. Aude, Stanolind Pipe Line Co., Tulsa, Okla.

Symposium on Combating Internal Corrosion of Gasoline Pipe Lines.

2:00 PM

DIVISION OF PRODUCTION

Criteria for Determining an Oil Field's Susceptibility to Secondary-Recovery Methods: (Private Dining Room 17)

(Sponsored by the Central Committee on Drilling and Production Practice)

Presiding: Paul D. Torrey, Consulting Engineer, Houston, Texas.

Papers on the following subjects are now under consideration by the Program Committee. Speakers will be announced later:

Part I: Schedule of Information Desirable for a Study of the Secondary-Recovery Possibilities of an Oil Field.

Part II: Analysis of Field Information and Discussion of Criteria Determining the Probability of Success of Secondary-Recovery Operations:

Preliminary Field Tests for Determining Proper Injection Pressures and Volumes, and Required Plant Capacity.

Geologic Factors Influencing Secondary Recovery.

Effects of Permeability on Secondary-Recovery Well Spacing, and Injection Pressures and Rates.

Relation of Total Fluid Saturation to the Selection of the Most Effective Secondary-Recovery Method.

Prediction of Secondary Recovery from Core Analysis.

Influence of Viscosity of Crude on Secondary Recovery.

Theoretical Calculations of Secondary Recovery.

Surface-Tension Effects in Secondary Recovery.

Electrolytic-Model Studies of Secondary Recovery.

Economic Factors in Secondary Recovery.

8:00 PM

DIVISION OF PRODUCTION

Drilling and Production Practice: (Private Dining Room 17)

(Sponsored by the Central Committee on Drilling and Production Practice)

Presiding: F. E. Heath, Sun Oil Co., Dallas, Texas.

Papers on the following subjects are now under consideration by the Program Committee. Speakers will be announced later:

Standardization of Electrical-Log Headings.

Relation of Permeability to Productivity Index.

Wednesday, November 10, 1943, 9:00 AM

DIVISION OF PRODUCTION

Production and Pipe-Line Topics: (Red Lacquer Room)

Building the "Big Inch" Pipe Line.

Burt E. Hull, War Emergency Pipelines, Inc., Cincinnati, Ohio.

Manpower—The Industry's No. 1 Problem.

John M. Lovejoy, Seaboard Oil Co. of Delaware, New York, N. Y.

9:30 AM

DIVISION OF REFINING

Research Reports and Catalytic Cracking: (Grand Ball Room)

Presiding: J. F. M. Taylor, Shell Oil Co., Inc., New York, N. Y.

Hydrocarbons in the Gasoline Fraction of 7 Representative Crudes, Including all the Distillates 40 to 102 Deg C and the Aromatics to 160 Deg C.

A. F. Forziati, C. B. Willingham, B. J. Mair, and F. D. Rossini, National Bureau of Standards, Washington, D. C.

The Synthesis and Properties of Hydrocarbons of High Molecular Weight—III.

R. W. Schiessler, D. G. Clarke, C. S. Rowland, W. S. Sloatman, and C. H. Herr, The Pennsylvania State College, State College, Pa.

Houdry Adiabatic Process for the Conversion of Petroleum Hydrocarbons.

Eugene J. Houdry, Houdry Process Corp., Wilmington, Del.

Cracking with Catalysts.

C. L. Thomas, N. K. Anderson, H. A. Becker, and J. McAfee, Universal Oil Products Co., Chicago, Ill.

10:00 AM

BOARD OF DIRECTORS

Board of Directors: (Crystal Room)

10:00 AM

BOARD OF COUNCILLORS

Meeting of Board of Councillors: (Private Dining Room 14)

To nominate candidates for election as members of the Board of Directors.

2:00 PM

General Session: (Grand Ball Room)

Report of Board of Councillors and Election of Directors.

President's Address:

William R. Boyd, Jr., President, American Petroleum Institute; Chairman, Petroleum Industry War Council.

Address:

Ralph K. Davies, Deputy Petroleum Administrator for War, Washington, D. C.

Address:

Warren H. Atherton, National Commander, American Legion, Indianapolis, Ind.

Address:

Colonel Bradley Dewey, Rubber Director, War Production Board, Washington, D. C.

GENERAL SESSION

8:00 PM

Motion Pictures: (Grand Ball Room)

"Oil for War"—Film Covering Construction of the "Big Inch" Pipe Line.

"Belvoir" Film—Oil Executives Go to War.

(These will be shown through the courtesy of The Barrett Division, Allied Chemical and Dye Corp., New York, N. Y.)

Thursday, November 11, 1943, 9:00 AM

DIVISION OF PRODUCTION

Drilling and Production Practice: (Red Lacquer Room)

(Sponsored by the Central Committee on Drilling and Production Practice)

Presiding: T. H. Acres, Richfield Oil Corp., Los Angeles, Calif.

Papers on the following subjects are now under consideration by the Program Committee. Speakers will be announced later:

Well-Completion Practices.

Proper Counterbalancing.

Pressure Maintenance in Midway Field, Arkansas.

Report of Division's Nominating Committee.

George S. Bays, Stanolind Oil and Gas Co., Tulsa, Okla., Chairman.

Election of Twenty Members of the General Committee of the Division of Production.

9:30 AM

DIVISION OF REFINING

Catalytic Cracking: (Grand Ball Room)

Presiding: W. B. Ross, The Pure Oil Co., Chicago, Ill.

Gas-Oil Cracking by the Cycloversion Process.

W. A. Schulze and C. J. Helmers, Phillips Petroleum Co., Bartlesville, Okla.

Recent Developments in TCC Processing.

T. P. Simpson, J. W. Payne, L. P. Evans, and C. V. Hornberg, Socony-Vacuum Oil Co., Inc., Paulsboro, N. J.

New Houdry Static-Bed Developments.

R. H. Newton and T. B. Pickett, Houdry Process Corp., Wilmington, Del.

Fluid-Catalyst Cracking for Premium Fuels.

E. V. Murphree, H. G. M. Fischer, E. J. Gohr, and W. J. Sweeney, Standard Oil Development Co., Elizabeth, N. J.; and C. L. Brown, Standard Oil Co. of Louisiana, Baton Rouge, La.

Report of Division's Nominating Committee.

J. T. McCoy, Tide Water Associated Oil Co., Bayonne, N. J., Chairman.

Election of Twenty Members of the General Committee of the Division of Refining.

10:00 AM

EXECUTIVE COMMITTEE

Executive Committee of Board of Directors: (Private Dining Room 8)

GENERAL SESSION

2:00 PM

General Session: (Grand Ball Room)

Address:

Hon. Harold L. Ickes, Secretary of the Interior, Petroleum Administrator for War, Washington, D. C.

Address:

Hon. Artemus L. Gates, Asst. Sec. of Navy for Air.

Address:

Hon. Charles E. Wilson, Executive Vice-Chairman WPB.

Foreign Oil Legion

George S. Walden

GEORGE S. WALDEN, president of Standard-Vacuum Oil Company, who served during the earlier period of the war as Petroleum Attaché to the American Embassy in London, has been transferred to Washington as special assistant to Deputy Petroleum Administrator for War Ralph K. Davies. With the growing importance of international oil supplies in war operations Mr. Walden's broad knowledge of the international field is held to be of special value in connection with future petroleum activities.

J. R. CARRINGER has been elected vice president of Standard Oil Company of New Jersey. He will continue as general manager of manufacturing operations. J. W. Connolly, who has been coordinator of marketing divisions, and Harry G. Burks Jr., assistant to the president, have been made directors.

COL. JOHN H. LEAVELL of Tulsa has been loaned to the State Department for special service in the Near East in connection with petroleum developments in that area. Col. Leavell, who has had long experience in the oil and mining industries, was decorated for gallantry in World War I and has been engaged in a number of special missions for the War Department since the commencement of the present conflict. For a time he was connected with the Army-Navy Petroleum Board and he also performed special service in the construction of the Alaska highway. His new position will be that of Petroleum Attaché to the State Department.

APPOINTMENT of William R. Argyle as assistant director of the Refining Division was announced by the Petroleum Administration for War. Mr. Argyle is on leave of absence as assistant manager of refining of the Sinclair Refining Company, with headquarters at Marcus Hook, Pa.

JAMES TERRY DUCE who has been serving the Petroleum Administrator for War as head of the Foreign Division resigned from this position effective October 15th, in order to resume his duties as Vice-President of California-Arabian Standard Oil Company with headquarters in San Francisco. "Terry" Duce, as he is affectionately known to members of the oil fraternity, is considered one of the best-informed men in the country on international oil matters through his long association with the South American operations of The Texas Company and his more recent service with the Texas-Standard's Near East subsidiary. His associates in PAW feel that he has done a remarkably fine job as head of the Foreign Division and regret his departure.

WILLIAM S. RICHARDSON has been appointed head of the newly-created chemicals division of the B. F. Goodrich Company, and E. F. Tomlinson succeeds Richardson as general manager of the company's industrial products sales division. Richardson has been with the pioneer Akron rubber concern since 1926, almost all of that time in the industrial products and sundries division. Tomlinson has been with Goodrich since 1927 in various sales capacities, including field positions in Chicago and Milwaukee, managership of farm service tire sales and, most recently, the movement of war supplies, through the company's national sales and service division.

ROBERT L. CROOK has re-entered the employ of Oil Well Supply Company, at San Antonio, Texas. Bob represented "Oilwell" in South America from 1933 to 1937. He had previously served as driller for British interests in Burma and for American companies in Argentine, Bolivia, Venezuela and Java, and as drilling superintendent in Borneo.

FREDERICK G. CLAPP of Bronxville, N. Y., consulting geologist, has gone to Ankara to become petroleum adviser to the Turkish government. Mr. Clapp was petroleum adviser to the Imperial Government of Iran in 1927-28 and again in 1933. He has done extensive geological exploration in China, Australia, New Zealand, Iran, Afghanistan and the Dominican Republic. He also is the author of numerous technical papers on petroleum geology in many parts of the world and has some travel books to his credit. In the last five years he has engaged actively in oil operations in Oklahoma. In 1936-37 he was technical adviser to Charles C. Hart in the negotiation of 500 thousand square miles of oil concessions in Iran and Afghanistan and a pipe line concession in Iran, all of which were obtained for a New York company headed by John M. Lovejoy, president of Seaboard Oil Company of Delaware.

(*Continued on page* 58)

J. R. Carringer

James Terry Duce

Frederick G. Clapp

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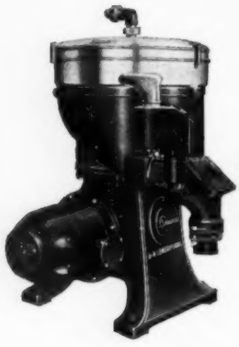

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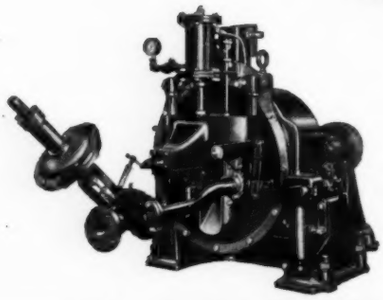
3 The self-cleaning centrifuge. Discharges solids automatically at full speed.



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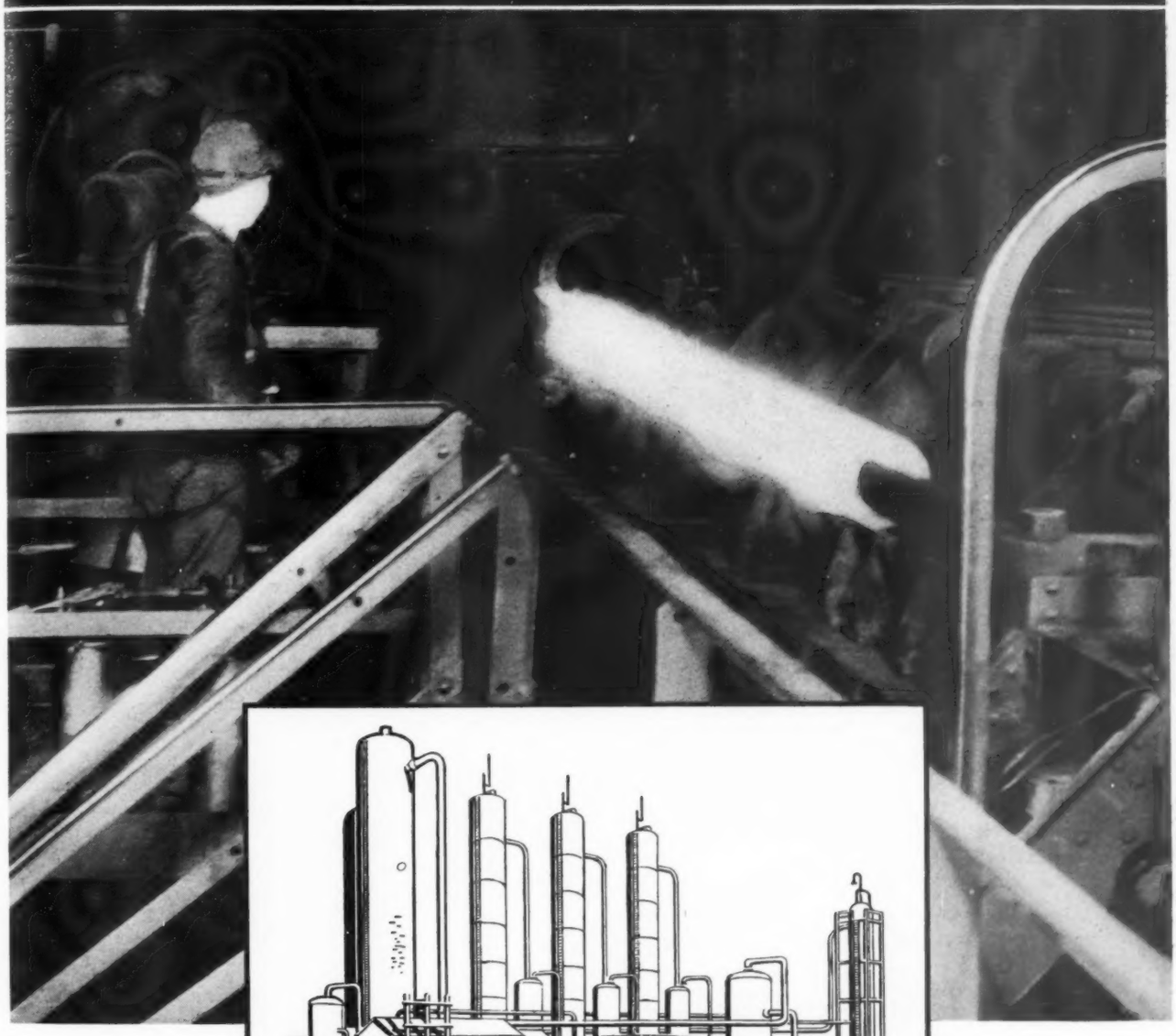
Keeping Pace with PEAK PRODUCTION



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FIND OIL IN FLORIDA

FIRST producing oil well on the Eastern Seaboard is Humble Oil and Refining Company's discovery in Collier County, Florida. Oil was found at 11,700 feet in a well located in the Everglades northwest of Miami. According to the statement given out on October 22nd, oil had risen to within a few hundred feet of the surface and 400 bbl. mixed with salt water, had been boiled out. The crude is of heavy type, high in fuel content. A fair volume of natural gas is produced with the oil.

Commenting on the discovery, Wallace E. Pratt, geologist and vice president of Standard Oil Co. (N. J.), said: "Successful completion of this well may be taken as evidence of the possible extension of the Gulf Coast oil producing region eastward through Alabama, Georgia and much of Florida. For many years geologists have believed that the northeastern coast of the Gulf and the states immediately adjacent ultimately would produce oil. These beliefs have been strengthened by the discovery".

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(*Continued from page* 54)

HARRY F. SINCLAIR, president of Sinclair Oil Company, with George Macdonald director, H. L. Phillips, president of Sinclair Prairie Pipe Line Company, and Hugh Russell, geologist, are spending several weeks in Venezuela in connection with plans of the company for expansion of its South American operations.

A PARTY of Standard Oil men headed by President Ralph W. Gallagher left New York in mid-October for a tour of inspection of the company's properties in Venezuela. Among the other members of the party are Eugene Holman, vice president and director, C. H. Lieb, president of Creole Petroleum and Harry C. Weiss, president of Humble Oil and Refining Company.

AMONG the other prominent oil men from the United States who are now in Venezuela are Leonard Henry of Standard Oil Company of California and Clarence Stark of Phillips Petroleum Company. Transfer of titles under the new petroleum law and preparation of applications for new concessions is now occupying the attention of most of the oil men resident in Venezuela and of numbers of visitors.

John I. Yellott

JOHN I. YELLOTT, has been appointed full-time director of the Institute of Gas Technology at Illinois Institute of Technology. Yellott, who has been chairman of the department of mechanical engineering and director of war training at Illinois Tech, assumed the duties of his new position as of Sept. 1. He succeeds Harold Vagtborg as director of the Gas Institute. Vagtborg will henceforth devote all his time to his duties as director of the Armour Research Foundation whose industrial research program demands his undivided attention. In becoming full-time director of the Gas Institute, Yellott will also assume the duties of directing the educational program. Dr. Lincoln R. Thiesmeyer, who formerly served as educational director of the Gas Institute, resigned Sept. 1 to enter government service.

No.3 IN A SERIES OF ADVERTISEMENTS TO PROMOTE CONSERVATION OF THE TIRES ON AMERICA'S CARS SPONSORED BY PETROLEUM INDUSTRY WAR COUNCIL

Gasoline Dealers Warned Tire Situation Continues to be Critical

Latest Report From Office Of Rubber Director Sees No Relief For Another Eight Months

READ this latest report from the office of America's Rubber Director! Your efforts to help conserve America's rubber have saved tens of thousands of tires. The recappers are being kept busy day and night.

But the job is far from finished. In fact, right now, it's more important than ever that every gasoline and tire dealer do his part to conserve America's biggest rubber stockpile—the tires on customers' cars.

Once those tires have worn beyond the recapping stage it's good-by tires and good-by customers.

Don't let this happen to you—give the tires on every car you service the best of care, and when necessary, see to it that they are recapped!

WAR PRODUCTION BOARD
WASHINGTON, D. C.

OFFICE OF RUBBER DIRECTOR
TEL. REPUBLIC 7500

September 23, 1943

IN REPLY REFER TO:

TO ALL GASOLINE AND TIRE DEALERS:

Because you, as service station operators, are in a position to be the most effective agents, you were urged by your government to help conserve America's largest stockpile of rubber - the tires now on America's cars.

Paced by the nation-wide campaign sponsored by the Petroleum Industry War Council, you have rallied to the emergency and are doing a fine job. But, don't let down now! For although fortunately we are now assured of an adequate supply of synthetic rubber, the job of supplying tires is still far from complete.

None but the most essential drivers can expect new tires at least until the middle of next year. This means that it is now more important than ever that you participate 100 per cent in America's tire conservation program by seeing to it that your customers' tires get the best of care, and <u>are recapped when necessary</u>. For once a motorists' tires become worn beyond the recapping point, in most cases, they can't be replaced, and you've lost a customer.

Tire conservation is a matter of good sound business as far as you are concerned, as well as your patriotic duty. Again we urge you and every gasoline and tire dealer to "Save the Carcass" of America's tires.

Very truly yours,

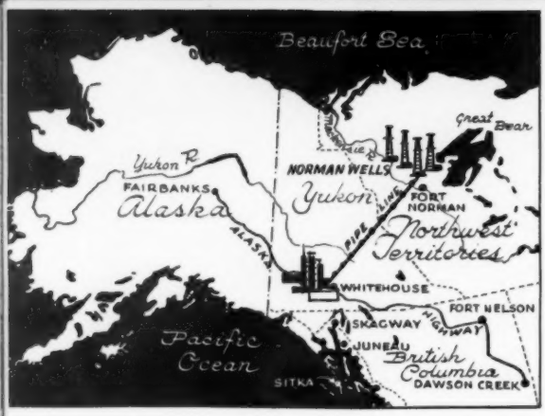
Bradley Dewey

Bradley Dewey
Rubber Director

Petroleum Industry War Council

(CREATED BY THE PETROLEUM ADMINISTRATOR FOR WAR)

Committee on Product Conservation



ARCTIC OIL FUELS ARMY'S ALASKAN OPERATIONS

BACK in 1920 a field crew of Imperial Oil Ltd., under geologist T. A. Link, drilled a well near Fort Norman, Canada, on the lower reaches of the Mackenzie River, only about a hundred miles below the Arctic Circle. They found oil. The result confirmed the belief that had frequently been expressed as to the existence of petroleum in that region but was of little practical importance at the time. The discovery was thousands of miles from any consequential market and was shut off from the outside world by lack of transportation. The only possible customers were a few power boats operating on the surrounding waterways during the brief summers and scattered users of kerosene in the sparsely populated area. Nevertheless five additional wells were put down in the next four years, three of the six being producers. A crude skimming plant was installed which enjoyed the distinction of being the northernmost refinery in the world.

In 1932 mining development around Great Bear Lake brought increased industrial activity to the district and led to the installation of modern refining equipment. Its output remained small, however, being limited to a few hundred barrels a day by the narrowness of its local market.

An enthusiastic believer in the industrial future of the Canadian Northwest was Dr. Vilhjalmur Stefansson and he became interested in the oil resources of the area as a factor in this promised development. In his capacity of advisor to the U. S. Army on the Far North Dr. Stefansson early called the attention of the Army's strategists to the potential value of Arctic oil. When war came the military authorities became interested in developing Alaska as a base of operations directed toward the North Pacific. The outcome of their study was the construction of the Alaska Highway and the provision of a fuel supply for vehicles moving over this highway and for army use in the Alaskan area.

In April 1942, Army officials approached Imperial Oil with a proposal that the company enter into a contract to drill wells in the Norman field and to supply oil for a projected pipe line to some point on the Alaska Highway where a refinery would be built. The three undertakings—wells, pipe line and refinery—were handled separately and independently but together they formed what has come to be known as the Canol Project, the purpose of which is to provide petroleum supplies to the extreme northwestern portion of the continent without exposure to the risks of ocean transportation.

The oil company was not altogether confident of its ability to supply enough oil from Norman Wells to feed a pipe line, even one of relatively small diameter. The field had not been drilled extensively enough to determine its limits and its productive capacity was unknown. After some discussion, however, the company agreed to make the attempt to increase its output sufficiently to supply the oil that the Army asked for. Drilling began as promptly as the necessary tools and machinery could be assembled. By January 1943 enough oil had been found to assure fulfillment of the production goal that had been set originally.

In the meantime, the Army had made a contract with Bechtel-Price-Callahan, an engineering and construction firm, to build a pipe line across the mountains to Whitehorse in Yukon Territory on the Alaska Highway, a distance of between five hundred and six hundred miles. At the same time it made an agreement with a Pacific Coast oil company to erect a refinery at the pipe line terminus.

By the contract made with Imperial Oil Ltd. the company agreed to deliver to the pipe line a specified quantity of crude at a price of $1.25 per barrel which is far below the cost of delivering crude from the United States. The Army undertook to defray the cost of drilling equipment and its transportation which the company will have the opportunity of acquiring after the war. After a certain amount of oil has been delivered the government is to deduct seventy-five cents from the $1.25 to be applied toward reimbursement for its expenditure while the remaining fifty cents is expected to cover the actual cost of production.

By the time the different sections of the project were under way the Army decided that it wanted several times as much oil as originally requested. In order to meet this demand the oil company had to acquire additional leases and to expand its drilling operations. The field proved to be more extensive than had been expected and its ability to supply the larger quantity requested has been demonstrated. What revision may be necessary in the original pipe line and refinery plans to handle the increased production has not been revealed.

In a press conference on October 15th, President Ralph W. Gallagher, of Standard Oil Co. (N. J.), parent company of Imperial Oil Ltd., made it clear that the negotiations leading to its contract were initialed by the U. S. Army and that the company was concerned only with the production of oil as stipulated by the contract, having nothing to do with either the pipe line or the refinery. It was pointed out also that the investment by the government in drilling operations was less than five percent of the figure frequently mentioned as representing the cost of the entire project.

Section of pipe-line being built through the wilderness of Northwestern Canada.

The Texas Company's policy of many years' standing is to make its patents and inventions available to the petroleum industry at prices that are reasonable.

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ELMHURST, L. I., N. Y.

EDITORIAL

(*Continued from page* 29)

Such a procedure fails to meet the ideas of some Washington planners who hold to the belief that the government should play a more direct part in the international oil picture. They argue that this can best be accomplished if the government itself owns oil properties abroad or has a substantial proprietary interest in them. One of the arguments that they put forward in support of their position is that under international law a government can take positive steps to protect its own possessions including the use of troops and ships if necessary whereas, if the same properties were owned by its nationals, government intervention would have to be confined to representations through diplomatic channels. To a layman this seems a somewhat narrow distinction and it may be assumed that the position of those who advance it is supported by other and perhaps more weighty considerations. When it is pointed out to these advocates of a "realistic" foreign oil policy that ownership of oil concessions or oil facilities in other countries would involve responsibilities from which it would be difficult to withdraw and the question is put as to whether they would have the government engage in the commercial operation of such facilities after the war their answer is "Why not?"

One of the fears that beset the American oil industry at the beginning of the war was that participation by the government in the operations of the industry might prove an entering wedge leading to complete federal regimentation and control. Thanks to the pledges given by Petroleum Administrator Ickes and the manner in which he has conducted the activities of the organization over which he presides this fear has been largely overcome. It is evident, however, that if the government were to engage in the oil business in other countries it might have serious repercussions within the country. The interests of the publicly owned foreign enterprises and the privately owned domestic industry might not always follow the same lines and government concern for the former might easily be used to support encroachments upon the latter.

GOVERNMENT LOOKS TO INTERNATIONAL OIL

(*Continued from page* 31)

On August 9, Mr. Crowley issued an amendment to the charter, and nothing further was uttered officially concerning PRC until August 23 when Secretary of the Interior—not Petroleum Administrator for War—Ickes announced "in his capacity as president" of PRC the resignation of Mr. DeGolyer and Mortimer Kline from PAW to take positions with PRC. Mr. DeGolyer, who had been assistant deputy petroleum administrator, was to become consultant of PRC and Mr. Kline, who had been PAW's associate chief counsel, was to be general counsel.

In subsequent left-handed announcements, it became known that Mr. Crowley was chairman of the board of directors. In spite of Mr. Ickes' presidency, the corporation still belongs to the Office of Economic Warfare, although it is now housed in the Interior Department. Other members of the board are Secretaries Hull, Knox, and Stimson. Late last month Mr. Ickes announced the appointment of E. Holley Poe as executive officer and general manager of PRC. Mr. Poe has been serving with PAW as director of the division of natural gas and natural gasoline.

Members of the oil industry naturally are keenly interested in the potentialities of Petroleum Reserves Corporation but are disposed to withhold comment until more specific information is forthcoming regarding its projected activities. So far as these are concerned with the conduct of the war they have no criticism to offer but they look askance at suggestions that the government, through the corporation or some other agency, may engage in the oil business on a commercial basis after the military emergency has passed.

Do you remember November 10, 1918?

Yes, that was the day before the Armistice that ended World War No. 1.

Thousands of Allied soldiers were killed on that day and thousands more wounded. *If the war had ended just one day sooner,* those thousands of men would have come home to their families safe and sound. One day can make a lot of difference in a war.

That's why there can be no let-up, no relaxation here on the home front. Every day's production counts.

Most American industrial workers—both labor and management—realize this grim fact. They are working night and day to bring the war to a victorious end as quickly as possible. They don't want this war to last even one hour too long—for the sake of their sons, brothers, husbands, sweethearts and friends.

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BRAND OF ANTIKNOCK COMPOUND
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Chrysler Building, New York City

Our war job is manufacturing Ethyl fluid for improving the antiknock quality of fighting gasolines.

Ambassador Castillo Najera (Right) Hands to Assistant Secretary of State Berle a Check for $3,796,391.04 on account of Oil Claims Against Mexico.

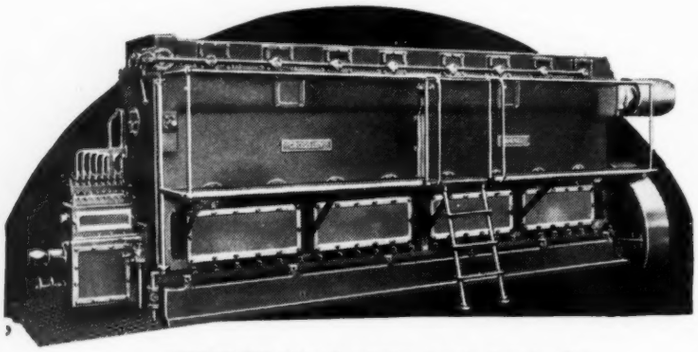
MEXICAN OIL CLAIMS SETTLED

FINAL chapter appears to have been written in the long drawn out discussion between the United States and Mexico over the seizure by the Mexican government of oil properties owned by American investors. The seizure, designated by Mexico as expropriation but generally referred to by the oil companies whose properties were taken as confiscation, took place on March 18, 1938. The order, issued by the then President of Mexico, General Lazaro Cardenas, was the outcome of the refusal by the companies of a Labor Board award which they claimed would have made it impossible for them to operate except at a ruinous loss.

In Washington the Department of State adopted a hands-off attitude until after the oil companies had carried out the hopeless course of presenting their case to the Mexican courts. Thereafter the matter was made the subject of diplomatic exchanges in which Secretary Hull took the stand, soundly based on international law, that a government had the right to take over property lying within its borders but that such action must be accompanied by compensation which must be "prompt, effective and adequate".

Chief point of dispute in the controversy was the oil companies' claim that their ownership extended to oil in the fields which they had legally held and developed while the Mexican position was that they were entitled only to remuneration for the value of their above ground improvements. The situation remained in deadlock until gathering war clouds impressed the authorities with the desirability of adjusting issues remaining unsettled between the two countries. An agreement then was reached to leave the adjustment of the claim to two official arbitrators representing the two governments. The oil companies remained on the side lines with no chance for a voice in the matter. Mexico stood firm on its limitation of liability to company owned plants and finally agreed to pay $23,995,991 for the losses sustained by American nationals with interest at three percent to the date of final payment. Interest on unpaid balances up to Sept. 30, 1947 will bring the total payment up to $29,137,700.34.

Principally affected were subsidiaries of Standard Oil Company (N. J.) to which were awarded $18,391,641. No announcement ever was made as to whether the company was willing to accept the settlement and according to rumor it never was asked. On Sept. 30, however, Mexican Ambassador Castilla Najera called upon Assistant Secretary of State Berle and handed him a check representing the first of five payments of the award with interest. Standard's only comment on the transaction was that after the company "had exhausted all legal remedies" the State Department undertook a settlement as the result of which the subsidiaries of the company would receive $18,391,641 plus interest of $3,940,843.



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U. S. ARMY TAPS CANADIAN OIL

FOR ALASKAN-BASED OPERATIONS

(*Continued from page* 36)

Wells. Only recently, when accommodations were ready, did the first contingent of office workers go to Canol Camp and the Wells, but all winter there were girl office workers in Skagway, Carcross and Whitehorse. They loved it. Girls being an overwhelming minority, every one of them was a queen, and northern romances and marriages were frequent.

It is noteworthy that over the million and a half square miles or so that the Canol Project covers, and with all the hazards involved, there have been few casualties. Few men have been killed, and serious accidents have been negligible. Despite the 70° below zero warning no one has been badly frostbitten. Indeed, the thousands of men doing outdoor work on the Canol Project in the North are in conspicuously good health, and many of them have grown luxuriant beards to emphasize their virility. There are safety engineers whose responsibility is to forestall accidents, and the U.S. Army maintains well-equipped hospitals at all the camps.

True, it gets cold in the wintertime in the North; but the men from Minnesota and Wisconsin were accustomed to just as cold weather at home, and the men from other states didn't suffer from it.

The vastnesses of northern Canada have amazed American construction men—even those accustomed to the open spaces of Texas and Oklahoma. And the immense distances have entailed a major problem, that of transportation. The initial plans for the Canol Project did not take this sufficiently into consideration. Nor did they allow sufficiently for the vagaries of climate and terrain. As one old Northerner put it, "These Americans are all right; they'll succeed. But they'll have to learn that you can't beat the North. You can't batter it down, you've got to study it and work in harmony with it. And then you'll find that it's friendly and will help you." So that is what they are doing. Men mustn't "fight" swamps, rivers, ice and cold, or mosquitoes either. They must deal with them methodically and intelligently. But it is never easy. In the winter you have to contend with darkness, storms, and cold-weather problems, keeping your motors operating; in spring, summer and fall you must contend with rain or mud or dust or bush-fire smoke or mosquitoes.

On the Canol Project, for transportation, almost every conceivable type of vehicle has been used, from canoes to barges and Diesel boats, from dog teams and pack horses to jeeps and command cars, from tractors and trucks to railroad trains and airplanes.

In the first stages of the Project, while there were millions of dollars' worth of ground and water equipment, there were no new airplanes available to carry freight and passengers and do reconnaissance. Second-hand planes were reconditioned and called into service, and among these were Bellancas, Fairchilds and Fokkers of the vintage of 1929—some of the very planes that had pioneered in northern flying. Hardy veterans, they came back to sing their swan song before being replaced by up to date Norsemen and Douglas Transports.

So the Canol Project rolls on. It is one of the indisputably good things brought by the ill winds of war. Every well drilled, every foot of pipe laid, every mile of road built, every boat or barge launched, helps to crack open the North to enrich Canada and the United States. And however many millions of dollars the cost may be before the job is completed, it will still be less than the cost of a couple of battleships which can be sunk in five minutes. But first and foremost, right now, the Canol Project is pointing its 1600 miles of pipelines like spears at the heart of Japan.

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Cementing casing in difficult lost circulation zones (such as depleted oil sands) sometimes requires a light-weight, gel-type slurry; and only AQUAGEL Cement has these characteristics. Where heavier cements would force themselves into the formation and be wasted, AQUAGEL Cement, lighter by as many as 20 pounds per cubic foot because of its higher water-cement ratio, may accomplish the job without trouble. If the formation is incompetent to retain even light-weight AQUAGEL Cement, loss of slurry is kept at a minimum by its gel characteristics which cause it to pile up and block rather than flow away into crevices.

Patent Licenses, unrestricted as to sources of supply of materials, but on royalty bases, will be granted to responsible oil companies and operators to practice the inventions of any and/or all of United States Patents Nos. 1,807,082; 1,991,627; 2,041,086; 2,044,758; 2,064,936; 2,094,316; 2,119,829; 2,214,366; 2,294,877; 2,304,256 and further improvements thereof. Applications for Licenses should be made to Los Angeles office.

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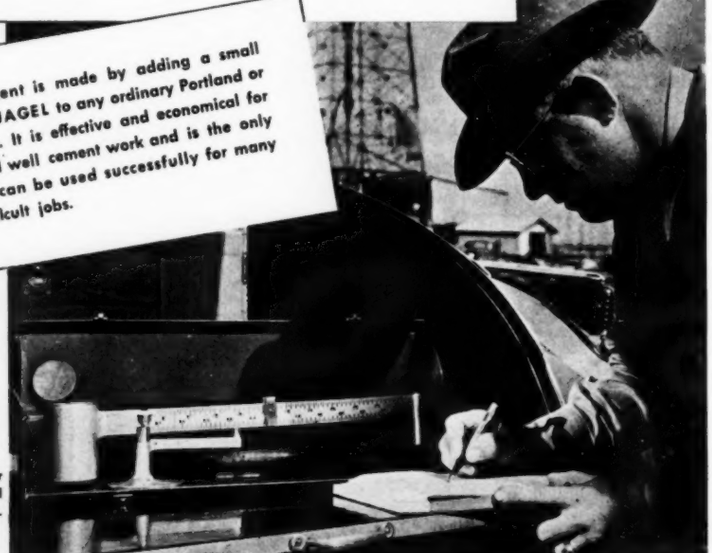

Baroid Service Engineer Weighing Slurry at the Well with Baroid Mud Balance.

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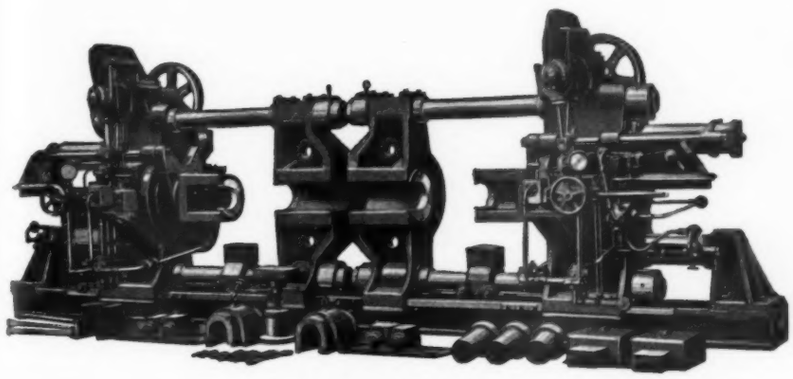

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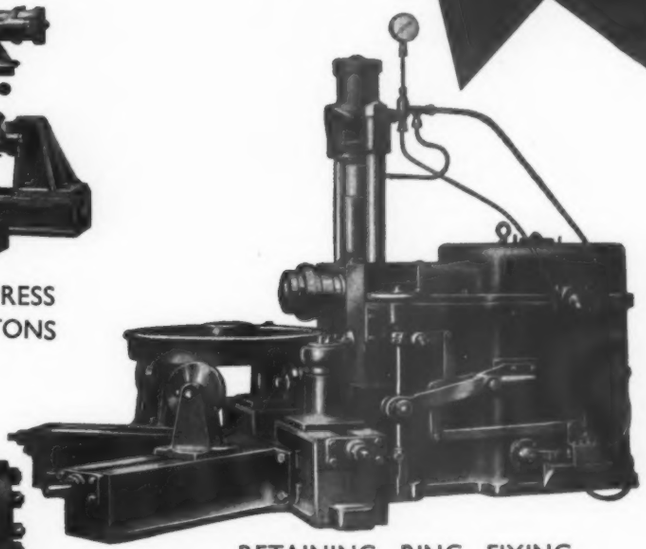

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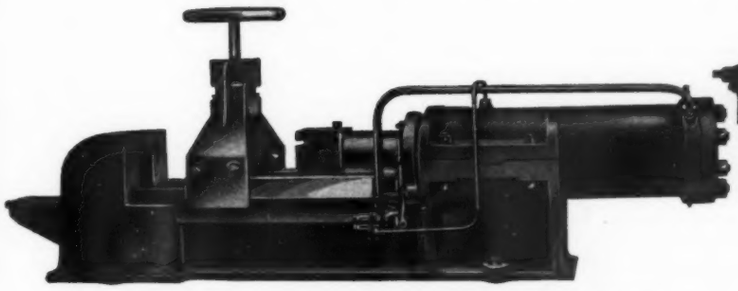

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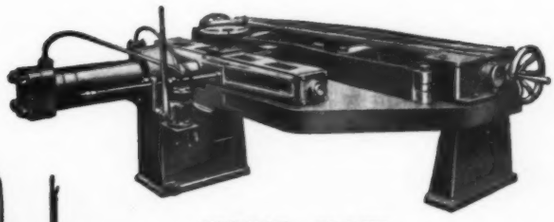

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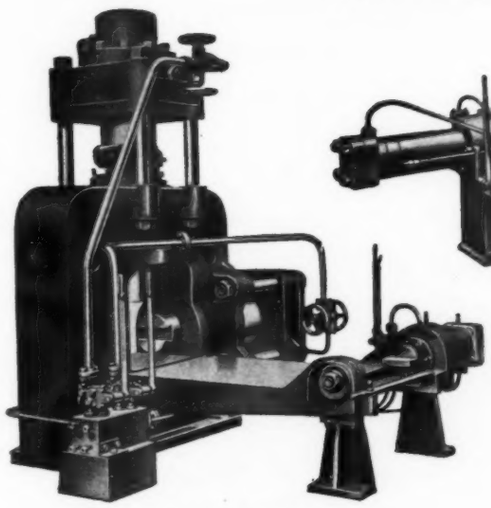

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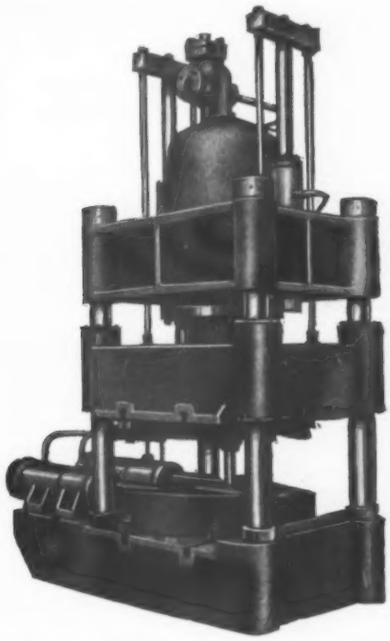

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WORLD PETROLEUM ABSTRACTS

Summaries of the Most Important Articles as Published in the Oil Press of the World Dealing with Technical and Economic Aspects of the Petroleum Industry—Edited by Dr. O. W. Willcox.

OPERATION

Developments in Preventing and Removing Mud Sheaths in Completing Wells—G. B. Shea, in BUREAU OF MINES REPORT OF INVESTIGATIONS 3706, May, 1943, pp. 29-39.

In a study relating to conditions in California oil fields it is pointed out that mud sheaths deposited on the face of oil sands constitute one among the most important of well-completion problems, even in high-pressure fields. Various methods have been developed for preventing and removing such sheaths. Existence of a plugged condition behind the liner is often not suspected in a new well, which may sustain its allotment with only a small part of the sand exposed to the liner perforations.

Marked differences in initial production from wells in correlative sands have been noted, and indicate that initial production rate often depends upon the manner of completion, and usually the reason is either that the mud sheath has not been effectively removed, or that water has filtered into the sand.

A first recourse toward preventing formation of a mud sheath is the use of a drilling fluid that can easily be washed from the face of the sand and yet minimize loss of water to the formation. Water blocking of the oil can often be overcome by the Travers method: fill the hole with casinghead gasoline and force it into the formation with light-weight mud; this will either diffuse the water into the formation or establish channels for the oil through the "water dam".

Good results have been obtained in some fields with oil as a drilling fluid, except in thick zones of interbedded sands and shales where tough plastic coatings may be formed. Also, several types of oil-base mud fluids have led to higher initial productivity indexes. New washing-in methods have eliminated swabbing and bailing, saving many hours of expensive labor, notably in the upper and lower terminal zones in the Wilmington field. In this field wells that do not flow naturally after displacement of the mud fluid by water or oil, gas at 900 psi is injected into the casinghead, and is manipulated so that oil and gas from the formation enter the well; it is a feasible system that has resulted in marked savings in completion costs.

In new fields in the San Joaquin Valley operators have eliminated swabbing in completing deep wells by introducing outside oil and gas into the tubing of the new well for displacing the column of mud fluid, thereby causing the well to flow. In low-pressure fields the sand face is cleaned by a Baker rotary wall scraper while a thin colloidal mud is being circulated. A new method is the B and W completion method, which uses metal wall-cleaning guides and a special wash assembly. Exceptionally good results have been obtained by this method.

For the past several years the calcium carbonate-and-acid treatment process for removing mud sheaths has been successfully used in many California fields. A recent method of acidizing, called "rocking", is to run mud fluid into the well followed by acid through the tubing which is displaced by clean water; pressure in the tubing is released and put on again several times, thus causing the acid to surge back and forth through the perforations of the liner; it has been very effective in high pressure wells.

An important advance in the art of cleaning wells is the Dowell "mud acid", composed of inhibited hydrochloric acid, sodium fluoride and other reagents that increase the solvent power of the acid on mud and clay-like materials. Its action requires only a few minutes as compared with hours with ordinary inhibited acid.

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AIR BLOWERS

FOUNDED 1850
HOLMES
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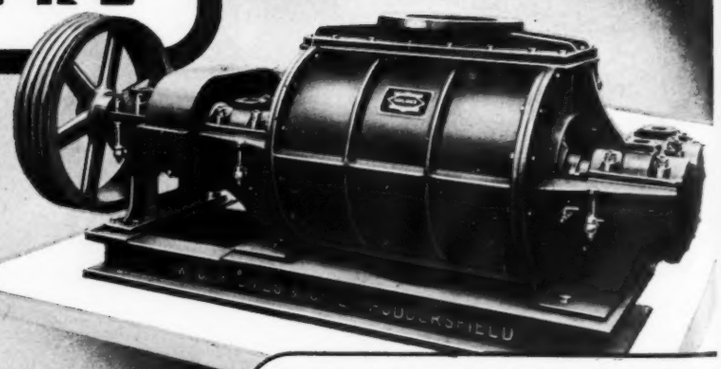

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DRILLING

Cost of Exploratory Drilling in Texas—H. J. Struth, in FACTS ABOUT TEXAS OIL.

Figures prepared for the Texas Mid-Continent Oil and Gas Association disclose that in 1937 new reserve discoveries in Texas averaged 330,000 bbl. per exploratory well, while in 1942 the amount of new oil found per exploratory well was 152,000 bbl. During this period of diminishing returns in bbls. of oil the cost of drilling went up, as shown in the accompanying table.

COST OF EXPLORATORY DRILLING—STATE OF TEXAS

Year	Number of Exploratory Wells Drilled*	Total Drilling Cost	Total Cost†
1935	2,720	$36,355,000	$ 85,315,000
1936	2,697	36,091,000	64,637,000
1937	3,023	42,073,000	102,533,000
1938	2,763	38,466,000	93,726,000
1939	2,496	35,379,000	90,291,000
1940	2,329	35,479,000	92,245,000
1941	2,436	41,208,000	111,261,000
1942	1,742	35,818,000	85,963,000

* Includes wildcat wells drilled and all dry holes drilled in State.

†Includes proportionate lost of acquiring and carrying leases, geophysical and geological expense and proportion of general administrative cost chargeable to exploratory work.

The average cost per bbl. is figured at 87.4 cents, as compared with 76 cents per bbl. in 1939.

While the operators are thus being whipsawed by higher costs and scantier discoveries, the demand for Texas oil is expected to increase from 484 million bbl. in 1942 to 576 million bbl. in 1943. (The implication is that exploration must be made financially more attractive to the wildcatters if the decline in discovered reserves is to be arrested.)

Accidents in the Petroleum Industry—From BULLETIN OF PETROLEUM SECTION, National Safety Council, March, 1943.

A report is made of a safety contest conducted under the auspices of the council. The results so far are given as follows:

Division	Frequency Rate 1942-43 (9 Mos.)	Comparison of Rates with 9 Mos. of 1942
All divisions	9.43	+ 1%
Natural gasoline	6.42	—22%
Manufacturing	6.47	+ 7%
Wholesale marketing	8.44	+ 5%
Oil and gas pipe line	9.76	+18%
Producing	14.22	0%
Retail marketing	18.03	+28%
Drilling	43.49	+15%

The average frequency rate for the first eight months of the contest is 9.43—an increase of one per cent compared with the same period of the 1941-42 contest. The only division showing an improvement over last year's contest is the Natural Gasoline Division—averaging 22 per cent. Natural Gasoline now has the lowest frequency rate of all divisions. The Colonial Beacon Oil Company of New York still holds the largest no-injury record in the contest.

CHEMISTRY

Sulfuric Acid Extraction in Acid Type Analysis—C. C. Allen and H. W. Duckwall, before AMERICAN CHEMICAL SOCIETY, Pittsburgh Meeting, September, 1943.

Sulfuric acid absorption experiments were carried out on a paraffin-naphthene-kerosene fraction containing known proportions of various benzene and naphthalene derivatives. It was found that employing several different ratios of 101.% acid to oil and extrapolating to zero acid to oil ratio, the complications due to incomplete removal of unsaturates, solubility of saturates in the extract, and attack of the acid on the saturates could be avoided. The data obtained on hydrocarbon mixtures and the saturated sulfuric acid raffinates by the extrapolation method could be combined to give information on the unsaturated constituents.

Method for Determining the Activity of Cracking Catalysts—Charles L. Thomas, Gustav Egloff, James Hoekstra and Wilbur Shand, before AMERICAN CHEMICAL SOCIETY, Pittsburgh meeting, September, 1943.

A 25-cc. sample of the catalyst is placed in a special reactor tube and a gas oil fraction passed over the catalyst at the rate of 100 cc. per hour for 2 hours at 500° C. The gas is collected and the weight determined. The liquid product is distilled to remove the gasoline and the weight of gasoline determined. The yield of gas plus gasoline as weight per cent of the charge is used as a measure of the activity of the catalyst. A sample of standard catalyst is employed to define an activity curve which is used for evaluating the activity of catalysts in terms of the standard catalyst.

Statement of the Ownership, Management, Circulation, etc., required by the Acts of Congress of August 24, 1912 and March 3, 1933, of WORLD PETROLEUM published monthly, August to June, semi-monthly in July at New York, N. Y., for October 1, 1943.

State of New York } ss.
County of New York }

Before me, a notary public in and for the State and county aforesaid, personally appeared Rex W. Wadman, who, having been duly sworn according to law, deposes and says that he is the general manager of the WORLD PETROLEUM and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation) etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Estate of Russell Palmer, 2 West 45th St., New York, N. Y. Editor, E. W. Mayo, 2 West 45th St., New York, N. Y. Business Manager, Victor N. Raiser, 2 West 45th Street, New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders, owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given) Estate of Russell Palmer, 2 West 45th St., New York, N. Y. Mona Palmer, Executrix, 2697 Tanoble Drive, Altadena, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state). None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

R. W. WADMAN
(Signature of General Manager)

Sworn to and subscribed before me this 20th day of September, 1943.

[SEAL] ELIZABETH M. DONLON

(My commission expires March 30, 1944)

Global war requires "bombing 'round the clock." To supply adequate quantities of fuel for our bombers, American refineries producing high-octane aviation gasoline must continue "refining 'round the clock."

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NATURAL GAS

Standby Fuel Services in Industrial Plants—R. W. Miller and Carl V. Spangler, before AMERICAN PETROLEUM INSTITUTE, DIVISION OF PRODUCTION, Pittsburgh Meeting. April, 1943.

Liquefied petroleum gases, including propanes and the butanes is a nearly ideal standby fuel for industrial plants, but recently natural gasoline has had considerable attention for similar usage, in the East at least. Natural gasoline compares favorably in cost on a delivered basis with liquefied petroleum gases, while the supply and delivery situation is even better than with those gases. Another advantage favoring natural gasoline is the availability at all times of tank cars; no special cars are necessary as with liquefied petroleum gases. Its use in the vapor phase has been thoroughly investigated by some natural gasoline producers in the Appalachian district and the conclusion reached that natural gasoline vapors can be used as a fuel in certain industrial standby installations, in a manner somewhat similar to the use of liquefied petroleum gases. One such installation is already in service, and it has proven satisfactory as a standby, the send-out fuel replacing natural gas when necessary. The 26/70 grade of natural gasoline is recommended.

Generally speaking, any application will require that the natural gasoline be vaporized at a low pressure with steam heat. The vapors are then regulated to atmospheric pressure and mixed with air by methods and equipment similar to those employed with liquefied petroleum gas standby installations. It is necessary that the vapors before and after mixing with air be kept at a temperature sufficiently high to prevent line condensation. It has been found that the natural gasoline vapors should be mixed with air to the extent of from 20% to 30%. The air-gasoline gas may then be piped to the burners, and, except for minor adjustments, will produce a flame reasonably equivalent to natural gas. In such an installation, it is necessary to insulate and steam trace the plant distribution lines in order to keep the vapor transmission temperatures between 150° F. and 200° F., this temperature preventing condensation troubles.

ASPHALT AND TAR

The Oliensis Test—Celestino L. Ruiz, Alberto Zanetta, Emilio Franchi and Juan T. D'Alessio, in BOLETIN INFORMACIONES PETROLERAS, Vol. 20, No. 223, pp. 33-38.

As is well known, the oliensis test is a spot test used to differentiate cracked asphalts from those obtained by vacuum steam distillation of selected crudes. The test consists essentially in diluting and heating the product with certain proportions of a petroleum distillate of fixed characterisics; afer cooling a drop of the solution is placed on filter paper, and note is taken of the homogenity of the spot thus produced.

In an experimental investigation of the subject the authors find that the best means of obtaining consistent results is to take surface tension as a measure of the solvent power of the dilnent. In their opinion it is sufficient to employ a straight run petroleum fraction bailing within 150° and 200° C, and which has a surface tension of between 24.5 and 25.0 dynes/centimeter at 20° C. This criterion takes the place of other properties, such as density, analine number and distillation given by oliensis as characteristics of a suitable dilnent. It will still be advisable to have the dilnent used for reference purposes prepared by the same central laboratory, and for all testing laboratories to use the same grade of filter paper for making the spot tests.

PHYSICS

The Mass Spectrometer as an Analytical Tool—H. W. Washburn, H. F. Wiley and S. M. Bock, in INDUSTRIAL ENGINEERING CHEMISTRY, Analytical Edition, Vol. 15 (1943), No. 9, pp. 541-547.

As shown in this work, which was executed in the laboratory of Consolidated Engineering Corp., Pasadena, California, the mass spectrometer has become an extremely valuable tool in the planning, execution and control of processes and work in the manufacture of aviation gasoline, synthetic rubber and other war materials. The raw materials entering into the composition of these products are complex, and the technical processes used for converting these raw materials are also, and necessarily, complex. This complexity creates the need for comprehensive convenient, accurate and rapid methods of analysis.

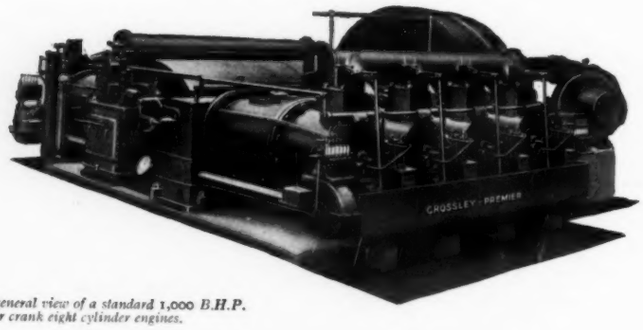
The mass spectrometer seems to go a long way toward fulfilling these requirements. The authors show how it is applied to the analysis of the following cases:

1. Dry gas.
2. Wet gas.
3. Normal and isobutane mixtures.
4. C_1 through C_4 paraffin and olefin.
5. C_3 through C_5 paraffin and olefin.
6. C_4 paraffins, olefins.
7. C_4 paraffins, olefins, and diolefins.
8. C_5 paraffins, olefins, diolefins and cyclics.
9. C_5 through C_6 paraffins, cyclics and aromatics.
10. Determination of benzene, toluene, and xylenes in gasoline.
11. Determination of small amounts of diethylbenzene in ethyl benzene.

Very complete information on the composition of complex mixtures of hydrocarbons thus becomes available in much less time than would be required by a fractionating operation, with excellent accuracy and with the added advantage of ability to detect and estimate components and impurities present in small amounts. For instance, small quantities of naphthenes have been found in wet gas; also, a small amount of acetone in a contaminated sample bottle. Good accuracy is obtained in the separate determination of C_4 when as much as 3 per cent of C_4 is present. Mixtures containing up to 15 different components can be analyzed. The results are practically independent of the skill and judgment of operators and computers; the computations can be made in a manner to indicate whether the analysis is sufficiently accurate, and whether any unexpected components are present. Usually only a tenth of a cubic centimeter is required for an analysis. Up to 20 samples can be analyzed in an 8-hour day with one spectrometer.

A commercial form of the apparatus is now available.

The principle of the mass spectrometer is that it is a device for sorting molecules by the combined action of electric and magnetic fields. In a manner of speaking, each kind of molecule is paraded separately from the others and caused to disclose itself to amplifying and recording equipment, where its presence is established on a record.



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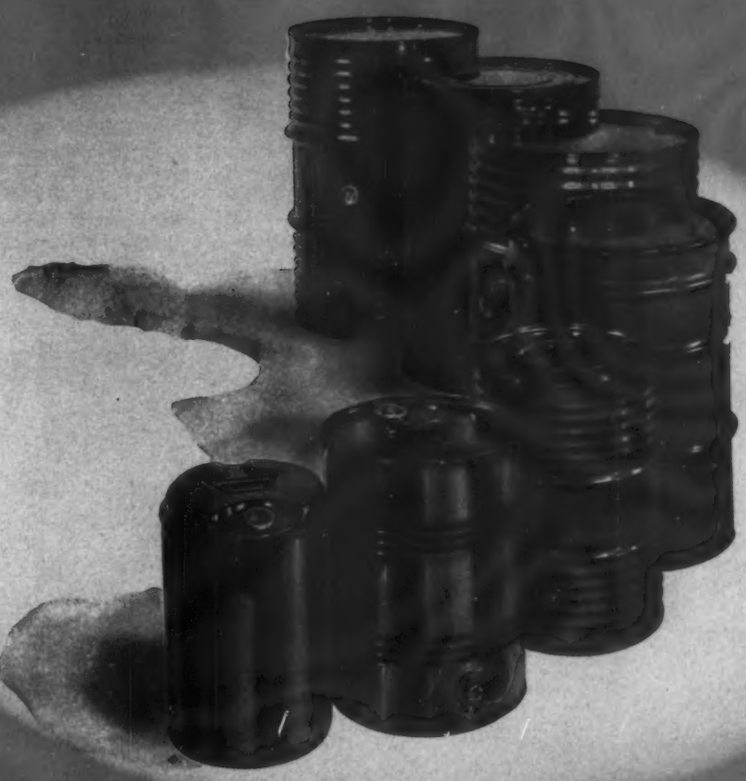

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REFINING

Catalytic Cracking by the Fluid Catalytic Cracking Process—E. V. Murphree and Others, before AMERICAN CHEMICAL SOCIETY, Detroit Meeting, April (1943).

The elementary principles of the fluid catalytic process are outlined, together with a simplified description of the design and operation of the apparatus employed.

A main characteristic of this process is its flexibility. Operations may be carried out over a wide range of temperatures in both the cracking and regeneration steps, and the depth or extent of cracking can also be considerably varied. Temperatures of reaction can be varied by means of heat applied to the oil in the furnaces and by the amount of hot catalyst circulated. Normally, the reaction temperatures lie in the range of 800°-1000° F. and the regeneration temperatures in the range 1000°-1200° F. The depth of cracking is governed by both the amount of catalyst in the reaction zone and by the ratio of catalyst to oil flow.

Pressures may be held at nearly any desired level; usually it is 10 p.s.i. at the top of the reaction vessel.

Before the war the development of this process was directed mainly toward production of high quality motor gasoline. Normally, motor gasoline is produced by contracting distillate stocks with the catalyst in a one-pass operation; a yield of 43 to 46 percent of gasoline is obtained from a variety of feed stocks. This motor fuel shows octane ratings of 91.3 to 94.3 C.F.R. Research '39 clear. Naphthenic feed stocks are preferable from the standpoint of both octane number and gasoline yield. Operations at the higher temperatures give higher octane numbers at some sacrifice of yield.

With the outbreak of the war, development of the process was shifted from motor gasoline to give greater emphasis to the production of war products, particularly high octane aviation gasoline, raw materials for synthetic rubber, and toluene. This shift required no major changes in basic equipment or design, but involved a choice of catalysts and the use of more severe cracking temperatures.

Production may be carried on as a one-pass operation at a high or a low temperature, or in a two-stage operation. Cracking at elevated temperatures with a suitable catalyst produces a gasoline containing fairly large amounts of toluene, xylenes and the higher aromatics, together with high yields of olefins and isobutane suitable for alkylation. The heavier gasoline fractions from this operation are valuable blending agents; hydrogenation of the whole gasoline gives a product with an octane number 97-98. Cracking operations with the same catalyst at relatively low temperatures produces an aviation gasoline which may be used directly without further processing in aviation blends. Certain naphthenic gas oils are especially adapted to these cracking conditions, and result in high leaded octane numbers. The disadvantage of low temperature catalytic cracking is the low quality of the olefins available for alkylation.

Aviation gasoline of high quality may also be obtained by subjecting the material produced in the first stage to a further catalytic treatment (two-pass) in the primary cracking unit (or in a separate treater). A product quality of roughly 90-97 octane number is obtained partly through elimination or saturation of the lower olefins, and partly through concentration of aromatics in the higher boiling fractions. This operation has particular merit where hydrogenation equipment is not available, and where the supply of light blending naphthas is limited.

USES

Low Temperature Characteristics of Greases—Thomas A. Maxwell, in REFINER, vol. 22 (1943), No. 1, pp. 16-18.

The quality of lubricants for military purposes has become of strategic importance. Besides good lubricating qualities, mechanical and chemical stability, and resistance to loss of oil by evaporation and to deterioration by moisture, military lubricants require minimum change of consistency at high and low temperatures. Usually it is possible to fabricate a grease that will function well under one set of extreme conditions, but it is of the utmost importance that all extreme conditions in military service should be covered by the least possible number of different lubricants. One specific phase of this serv-

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ice requiring a special lubricant has been the exposed bearings of military aircraft. These may be alternately roasted under tropical suns and chilled to perhaps 100 degrees below zero on nocturnal flights in zero weather.

Work in the laboratories of the International Lubricant Corporation was undertaken to establish a background for the fabrication of lubricants for such conditions, particularly as regards the role of different soap bases and different oil viscosities in determining the behavior of greases in ball-bearing service at low temperature. The method and apparatus for this investigation corresponded to the torque test of Army-Navy specification AN-G-3-42, using liquid nitrogen to produce very low temperatures. The oils used had Saybolt viscosities at 100° ranging from 34 to 100; the metal soap bases tried were aluminum, sodium, lithium, lead, calcium and barium.

In summary, it is stated that the low-temperature bearing torque characteristics of greases fabricated from different metal bases and low viscosity index oils appears to be dependent chiefly on the viscosity of the oil used. Barium greases seemed to stiffen somewhat above the average of the other greases tested. For barium greases, therefore, a lighter oil might be admissible. All the greases performed satisfactorily at 120° F., and there is currently little interest in greases for lower temperatures. Hence the limiting oil viscosity for greases satisfactory at 120° F. will be somewhere in the neighborhood of 36 to 40 seconds at 100° F.

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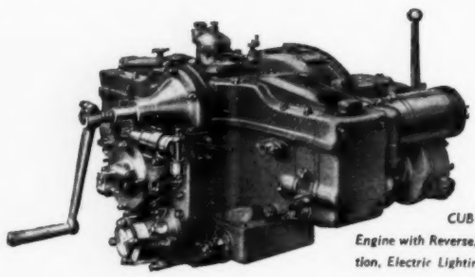

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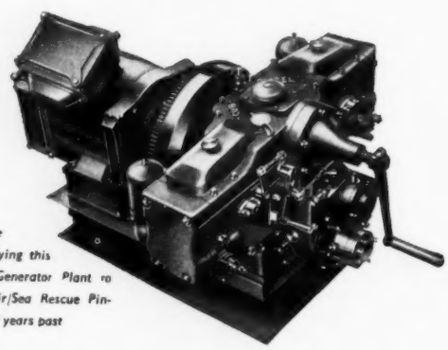

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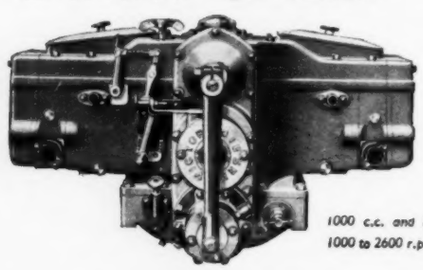

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Apparent Rise of Oil Industry Earnings Illusory

(*Continued from page* 49)

Increases of the oil reserves and in the potential production of the nation are absolutely essential under its present economy and war effort unless it is to suffer irreplacable loss. It is apparent that an increase in the price of oil is necessary to the accomplishment of these increases.

The advance suggested by the Petroleum Administration for crude oil is an average of 35 cents per barrel or an increase of about 30 per cent for each grade of crude. This would result in an additional income to the producing industry that would be no more than the minimum required to accomplish the objectives of increasing the life of stripper wells, bringing areas of leaner production into economically drillable reserves and lead to the drilling of a greater number of wildcat wells. Naturally it will be necessary to increase the prices of certain or all petroleum products in order that the refiner may be able to purchase his crude oil at the advanced price. The OPA objects to this as being inflationary. This is not actually the case. There would be no extra profit to the refining industry and the extra profit accruing to the producing industry would be returned to the fields in the form of new wildcat wells and longer lived producing wells, or else the excess profit accruing to any company or organization as the result of the increased price and above the reasonable profits set by the Congress would be returned 90 per cent to the government in the form of taxes. A large percentage of the petroleum products being manufactured in this country are presently sold to the government for the conduct of the war. To the extent of its increased costs of products the government would be making available the funds necessary to increase the oil reserves and stripper well production of the nation. Excess profits would be returned to it as taxes.

The only possible additional profit to the oil producing industry would be new reserves in the ground. This is the objective of all exploratory effort.

There has been no general price increase in three years and oil is now selling at about the same figure as in 1937. All operating costs are much higher and the cost of finding oil is much greater. It is not within the realm of possibility for the oil producing industry to continue to play its most essential part in our war effort and at the same time support the domestic economy without substantial relief. A price increase for crude oil is absolutely necessary.